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ABSTRACT

The report describes activities conducted during a 12-month baseline period preceding a series of longitudinal studies of the costs and effects of various types of early intervention with handicapped children conducted by the Early Intervention Research Institute at Utah State University. A systems theory perspective forms the theoretical base for the design of the longitudinal studies, influencing site selection, choice of instrumentation, and plans for analysis. Detailed results of four feasibility studies are reported, including one which investigated effects of two levels of parent participation with their handicapped preschool-aged children's special education programs. Aspects of the study regarding recruitment and assignment of subjects to groups, data collection, instrumentation, treatment verification, and attrition were examined as part of the feasibility activities. The remaining feasibility studies examined the effectiveness of three early intervention pilot projects in Illinois, each differing in various aspects of program design and service delivery. The baseline report also describes sites which are proposed as collaborators in the longitudinal research, and summarizes additional information concerning instrumentation, design/analysis issues, cost analysis procedures, and treatment verification procedures which emerged as a result of the feasibility studies. A final section reports on project management over the course of the initial 9-month period. (JW)

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BASE PERIOD REPORT

for the

LONGITUDINAL STUDIES OF EARLY INTERVENTION EFFECTIVENESS

Submitted by:

the Early Intervention Research Institute at Utah State University

Submitted to:

U.S. Department of Education as a part of contract #300-85-0173

July 1, 1986

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BASE PERIOD REPORT

for the

LONGITUDINAL STUDIES OF EARLY INTERVENTION EFFECTIVENESS

On October 1, 1985, the Early Intervention Research Institute (EIRI) at Utah State University undertook a contract to conduct a series of longitudinal studies of the costs and effects of various types of early intervention with handicapped children. The first 12 months of this contract were designed as a baseline period during which the following general activities have been addressed.

- Select research collaborators. Although the original proposal submitted to the Department of Education specified a number of collaborators and alternates, it was understood that additional sites would be recruited and that additional information would be collected during the first 12 months of the contract to decide which sites were most appropriate for conducting the longitudinal research.

- Conduct feasibility studies in order to refine procedures. The original proposal described a variety of procedures to be used in actually conducting the research (these procedures covered a wide variety of issues, including: (1) assigning subjects to groups, (2) instrumentation, (3) treatment verification, (4) cost analysis, and (5) data analysis). It was anticipated that, as a result of actually conducting several small scale feasibility studies, refinements in some of these procedures would be necessary before implementing the 16 longitudinal studies.

- Fund raising. The contract with the Department of Education was limited in several important ways because of the amount of funding that was available (the most important limitation was the breadth of outcome measures which could be assessed). Furthermore, none of the Department of Education money could be used for actually delivering the services necessary for the experimental conditions to be investigated. Thus, a major task of the baseline period was to identify additional funds to broaden the types of outcomes that could be assessed and to assist interested potential collaborators in identifying resources which could be used to expand or systematically vary the types of interventions being provided.

This report describes the activities of the project staff in each of the above areas for the period between October 1, 1985, to June 30, 1986.

As a part of that description, conclusions are drawn about the feasibility of implementing the research plan, and alterations from the original plan (e.g., the specific sites to be used, and the specific measures of child and family functioning to be used) are described in detail. The advice of the National Advisory Committee is summarized and other strategies used by the project staff to solicit input about the longitudinal research are described.

The remainder of this report describes the theoretical/conceptual framework upon which the studies are based, summarizes the four feasibility studies conducted during the last nine months, describes the specific sites that are proposed as collaborators in the longitudinal research, summarizes additional information with regard to instrumentation, design/analysis issues, cost analysis procedures, and treatment verification procedures which have emerged as a result of the feasibility studies, and briefly describes the management of the project during the last nine months.

I. THEORETICAL/CONCEPTUAL FRAMEWORK

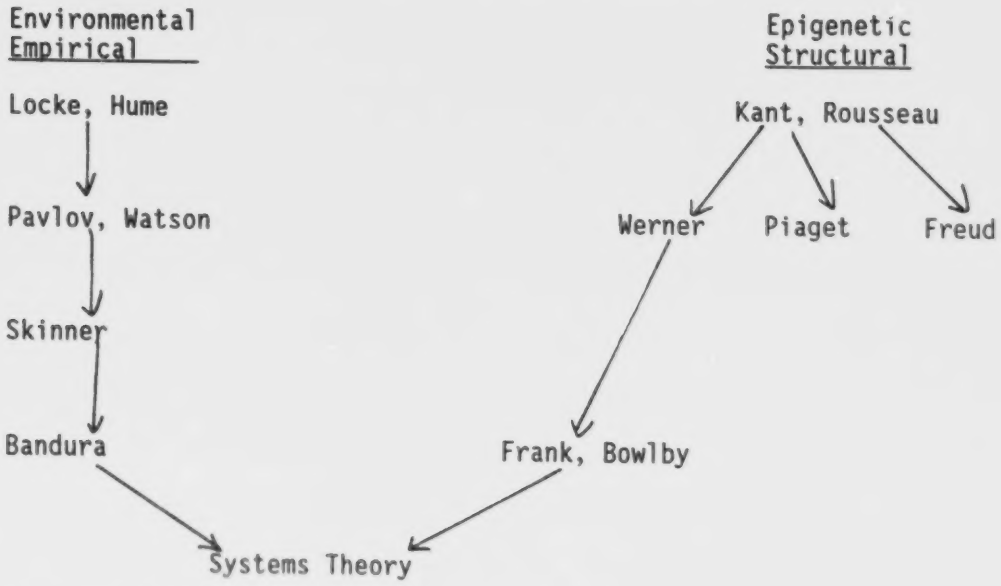
Attempts to explicate organizing principles which can explain growth and development in normal and handicapped children have intrigued philosophers for centuries. The conceptual framework which directs our longitudinal studies of the efficacy of early intervention stems historically from two separate but related conceptions of development. A brief look at these theories, placed in a historical context, is provided below to give the reader a better sense of the development of our organizing principles.

Historical Context

One of the first attempts to address theory building in child development originated in England with John Locke who is best known for his conception that the infant's mind is a blank tablet (tabula rasa) on which the environment makes its impressions. Locke, along with David Hume, advocated early intervention based on the notion that the child was essentially a product of the environment in which he grew up.

A different point of view from Locke and Hume came from both Germany and France in the writings of Immanuel Kant and Jean Rousseau. In what appears to be the first building blocks for systems theory, Kant proposed the view that an infant is purposive and active, and that early intervention should be based upon providing those experiences which are developmentally appropriate.

From these two very different theoretical positions come a variety of conceptions of infant and child development. The diagram below depicts our conception of how systems theory developed in relation to other child development theories.



From our standpoint, systems theory represents a basic rapprochement of the two initially very different conceptions of development. We will now trace the evolution of systems theory to the present time and then describe the conceptual framework which undergirds our present program of research.

Heinz Werner (1957) articulated certain principles which relate closely to the development of systems theory. Werner hypothesized that the human infant develops from a primitive level that is global, undifferentiated, and unarticulated; to a state of differentiation, articulation, and hierarchic integration. Werner also held that development occurs along many different lines of functioning at the same time, but not always at the same level. To discern the importance of this statement, consider an example from early intervention. An infant acquires skills across all developmental domains at the same time but at different levels of functioning. Although the development of some skills are necessary prerequisites for other skills (i.e., development is continuous), there are also many examples of discontinuity in development. The conception that early experience is important, but that development may be discontinuous occupies a central

position in our early intervention conceptual framework and we will return to it later.

More recently, the writing of Ludwig von Bertanlanffy (1968), L. K. Frank (1966), John Bowlby (1969), Albert Bandura (1977), Arnold Sameroff (1975), Urie Bronfenbrenner (1977), and Craig Ramey and his associates (1982), have provided us with our current perspective on the implications of systems theory for early intervention. Bertanlanffy (1968) developed the notion of a system as an aggregate, or set of interdependent parts or components. He also set forth other properties of systems including the permeability of boundaries between systems and the relative flexibility of component parts of a system to work together effectively or otherwise. Frank (1966) discussed the infant as a system.

> To advance the study of infants we may formulate a model of the infant as a General Purpose system. Such a model would recognize the inherited potentialities of the young organism and the basic processes operating in this self-organizing, self-stabilizing, self-directing, largely self-repairing, open system which becomes progressively patterned, oriented, and coupled to the culturally established dimensions of his environment, natural and human. (p. 178)

Systems theory thus regards normal infants as competent organisms equipped with purposive behavior patterns, efficient effectors, and feedback mechanisms which facilitate goal-oriented behavior and adaptation to their environments. For handicapped children, insults to their systems may make the development of goal-oriented behavior and adaptation to their environment problematic.

In our view, much previous research on early intervention may have been hindered by limited models of general development and the related simplistic models of causality applied to intervention programs. Environmentalists, hereditarians, and proponents of the medical model have tended to emphasize a unitary relationship between an initial problem (e.g., deprivation) and a later outcome (e.g., school failure). Too frequently, studies based on

these types of models have focused on only one developmental domain, as we pointed out in a recent review of early intervention efficacy literature (see White & Casto, 1985).

Dissatisfaction with earlier models led to the development of increasingly more sophisticated interactive approaches such as Sameroff's (1975) transactional model, and Bronfenbrenner's (1977) ecological model of human development. These models emphasize bi-directionality and consideration of a broad range of outcome domains. The use of these models has guided the development of such studies as the Perry Preschool study (Berrueta-Clement et al., 1984). The general systems model, as developed by Ramey, MacPhee, and Yeates (1982) seeks to expand on and complete the earlier bi-directional models. (Meanwhile, the ecological model has been further expanded and developed [Bronfenbrenner, 1979; Goelman & Pence, 1985], and there may be little difference other than terminology between the two models at this point.)

The writings of Albert Bandura (1977) have also contributed much to further explication of the reciprocal interaction which occurs between cognitive, behavioral, and environmental determinants of development. In a sense, then, our conceptual framework represents an amalgamation of certain environmental and structural views of development.

Assumptions of the EIRI Conceptual/Theoretical Framework

Our framework has the following four major assumptions relating to early intervention which have guided the development of the longitudinal research studies.

1. The infant is an interactive organism who becomes a product of a series of interacting units. Given optimal conditions, the infant develops a repertoire of behaviors over several domains. However, the handicapped infant has received an insult to its bio-social system which may deter both

activity and interaction--this infant requires intervention. To the extent that the handicapped infant can be assisted by other units in the family system, outside intervention may not be required. However, it is often the case that the family system is unable to respond appropriately on its own and other systems, which are outside the family unit, are required to intervene with the infant and its family if the infant is to develop optimally.

2. Development in handicapped infants is both continuous and discontinuous. This view of development was first espoused by Heinz Werner as mentioned earlier. It is also seen by many early intervention researchers as being antithetical to the belief that early experience is instrumental in the child's future development. Bricker (1986), for example, holds that the notion of continuity of development is fundamental to prevention and early intervention. From an environmental position this would be true. From a systems perspective it is not. We believe that rather than proceeding in orderly sequences, development sometimes occurs in the form of qualitative changes that come into being all at once. Consider a skill which is common to the human species such as walking. A rich literature attests to the fact that infants who have had little opportunity to practice (Dennis, 1951) walk at only slightly later ages than those who have had extensive practice. This seems to be true for a variety of skills which are phylogenetic in nature, that is, skills which are common to the species as a whole.

We further believe that some development may be discontinuous in handicapped infants because of the insults they have incurred in their biological systems, insults which are sometimes so great that progress, no matter what the type of intervention, is sporadic and discontinuous. A final point about discontinuity in development comes from a view expressed

by McCall, Hogarty, and Hurlburt (1972). Like McCall et al. (1972), we believe that some skills are interrelated across age ranges and represent continuity while others are independent and, therefore, represent discontinuity.

3. Development is characterized by plasticity and self righting tendencies. The genetic potential of the handicapped infant interacts with the environment to produce developmental changes. For some handicapped infants, the genetic potential is impacted on by a deleterious influence. For example, the infant who suffers a cerebral hemorrhage at birth has received an insult to his/her biological system. The plasticity construct would predict that recovery from that insult would depend on the plasticity of the biological system, the support system furnished by the family and immediate environment, and the type and duration of planned interventions. Thus, the prognosis would be poorest for those infants having major insults, whose families cannot provide a supportive environment, and who do not receive intervention services. From this perspective, one would hypothesize that the same early intervention program would be differentially effective based on both genetic potential and the degree of insult. Similarly, we are able to see infants with the same degree of insult to the brain and receiving the same interventions who progress differentially. This causes us to infer that there is plasticity in development and that the infants self-righting capabilities (i.e., an inherited characteristic) play a major role in intervention outcomes.

4. In maximizing developmental potential, both hereditary and environmental factors are important. The handicapped infant possesses a genetic potential which has major implications for development. Environmental factors, which are present from conception on, interact with genetic potentials to produce varying levels of development. Since, at the present time we have limited control over genetic potential (except in

prevention areas), our resources should be utilized to produce optimal environments for development.

Such optimal environments would include a family system which can assist the infant, and an intervention system which is responsive to both infant and family. Systems theory holds that the birth of a handicapped infant impacts on two interrelated systems. First, it forces the primary system (the infant) into an attempt to restore equilibrium; and second, it forces the larger system (the family) into an attempt to restore equilibrium. In the case of the handicapped infant, some outside resources (early intervention) are usually required to restore equilibrium. In the case of the family, resources inside the family may result in the restoration of equilibrium in some cases, while in other cases, early intervention efforts may be required.

General Implications of Systems Theory For Early Intervention

Systems theory would thus hold that interventions should be directed at both infants and the larger family system. Interventions should be targeted to the developmental level of the infant and also to the equilibrium level of the family system. In the infant with intraventricular hemorrhage, interventions would be aimed at restoring motor equilibrium. With blind and deaf infants, the interventions would be geared to restoring the infant's contact with the environment. In both instances, interventions should be aimed at stabilizing the family system to the degree necessary.

Systems theory would argue for investigating the effects of intervention with all types of handicapping conditions. If one is to determine the impact of a handicapping condition on a child, the family, and the larger environment, and also determine the outcomes of intervention programs across the three, then the enrollment of infants with a variety of handicapping conditions would be most appropriate. Systems theory would

predict that the severely handicapped infant would have the most difficulty in restoring equilibrium, and that the families of such infants would also have the most difficulty in restoring equilibrium.

Systems theory would hold for the use of outcome measures which are geared to a broad assessment of the infant, the family, and various aspects of the larger environment. The dimensions of the child's system which should be addressed include health characteristics, temperament, and the developmental domains of cognition, language, motor, social-emotional, and self help. The dimensions of the family system which should be assessed include: parenting style variables including ways that affection toward the child are expressed, the degree of parental and sibling involvement in the child's activities, the degree of parental and sibling responsiveness to the child, and parental discipline patterns. Also, to be assessed are system-wide attributes related to early intervention including levels of stress in the family system and support networks available.

Systems theory would argue that the transactions which occur between the infant and the family system are important and that these interactions should be documented and analyzed. Also critical are the interactions which occur between the family system and the intervention system. The characteristics of the infant, the family system, and the intervention system interact to produce certain outcomes across all three systems. Here again, the transactions which develop across the systems should be recorded and analyzed.

Outcome measures from a systems viewpoint should account for both individual and system changes. Detail on an individual would reflect a concordance between the individuals' handicap, the intervention delivered, and the outcome measure. Data collected on families would reflect

concordance among the level of equilibrium in the family, the interventions aimed at restoring equilibrium, and outcome measures.

Intervention takes place within a broader social context. Intervention programs which are specifically designed to impact on a handicapped infant or young child may become diffused or altered through the interactions which occur between the various systems. The characteristics of the intervenor including such attributes as emotional health and stability, self esteem, problem solving, coping skills, and level of intervention skills possessed, interact with the characteristics of the infant and family system to alter and change interventions.

Systems theory would hold that comprehensive procedures should be implemented to verify treatment implementation as intervention proceeds. The verification of treatment implementation should be an ongoing process rather than a one time process. Both the subtle changes which occur in interventions over time and any dramatic changes which distort the basic characteristics of intervention program should be documented.

The diagram below applies a systems framework to early intervention.

Inputs	Contexts	Outputs
• Handicapped Infants and Young Children Having Various Types and Severities of Handicapping Condition	• Socioeconomic Status of the Family • Quality, Intensity and Duration of the Intervention • Intervenor Skill Level	• Child Outcomes Family Outcomes

In sum, from a systems theory viewpoint, the infant or young child represents a system within a larger family system within a larger societal system. In the intervention paradigm, the inputs consists of handicapped infants and young children requiring intervention. Examples of critical

contextual conditions include the socioeconomic status of the family, the quality, intensity, and duration of the intervention program, and the skill level of the intervenor. Contextual variables such as these interact with the inputs to produce varying outputs across domains related to both child and family.

Implications of Systems Theory for the Design of the Longitudinal Studies

The systems theory perspective has influenced all aspects of the proposal development and planning for Years 2-5. Specific examples of decisions made during the institute's base period work that reflect the systems perspective are site selection, choice of instrumentation, and plans for analysis.

The site selection criteria focus primarily on the child and the intervention program, but systems concerns were not neglected in the application of the criteria. For example, we tried to obtain heterogeneity across sites in the systems that constitute the context for intervention--regions, communities, school districts, and families. This provides for generalizability. At the same time we tried to limit the heterogeneity of systems within sites when sample size was relatively small. This reduces the number of system's interactions that we must consider in interpreting the data. Perhaps the clearest example of the influence of systems theory is our proposal of three parent involvement studies. The family is a particularly important system because it is the system primarily responsible for infants and young children, and it is the system with the most continuity (within each day as well as across days). The rationale for parent involvement is that intervening to change the family system will intensify and increase the duration of intervention effects. Of course, the extent of systems theory's impacts on site selection go beyond the few examples given here.

The instruments chosen also reflect a systems perspective individually and taken as a group. The Battelle Developmental Inventory was chosen as a core measure of child change because it is a broad test covering many domains and applicable to a wide age range. Assessment of many characteristics is consistent with the view of the child as an evolving system. Although the cognitive domain is important, a child's characteristics interact over time and social development, cognitive development and health are not independent. The core parent instruments also indicate the importance of that system in our theoretical framework and the variety of domains that are important for that system. The community is also assessed through questions to the parents regarding resources, social support, and family history. Furthermore, links to the medical system and school system are to be investigated. Finally, economic analysis links the family and the intervention program to the broader community by measuring costs and longitudinal effects which will be manifest in other systems (primarily the schools, but perhaps medical and social service systems as well).

Systems theory also influenced the types of statistical analyses techniques chosen for the research. For example, the use of ANCOVA explicitly acknowledges the relationships among systems. When sample size allows, it may be possible to extend the multivariate analysis to structural modelling using such techniques as partial least squares (Lohnes, 1986) to estimate path models. Second, the economic analysis implicitly represents a systems perspective, and we have proposed to expand the systems framework to include demand as well as supply (cost) factors. The economic parameters may be estimated through a variety of methods for estimating structural equation models.

It should be clear that the broad conceptual/theoretical framework described above provided the overall structure for our research plan and

drove many of the decisions in designing the planned comparisons, data collection, and analysis proposed for each study. Within the broad conceptual frame, previous theoretical and empirical research also contributed to study design, as did the salience of cost implications. As data are collected and new decisions are made based on the analysis and interpretation of those data, the conceptual/theoretical framework will continue to be important. Nevertheless, we anticipate that the research will yield behavioral insights that lie outside the realm of existing theory. Such empirical discoveries have been the source of many of the most significant advances in early intervention research. For example, the finding that despite IQ fade-out, disadvantaged children continued to do better in school as a result of preschool interventions was not theory driven. In addition, such findings will play a major role in future theoretical development.

II. FEASIBILITY STUDIES

During the base period year, four studies were conducted in order to examine the feasibility of implementing the research procedures to be utilized in the longitudinal studies. Identification of subjects, random assignment to groups, monitoring treatment implementation, training and monitoring diagnosticians, instrumentation, and maintaining contact with sites on a regular basis were all procedures which required field testing. Several feasibility studies were conducted in order to provide information about a variety of programs and research questions. One study was conducted in Salt Lake City and allowed for an in-depth analysis of many of the procedures which would not be possible with more geographically distant programs. The other three studies were conducted in the state of Illinois, where it was possible to test the feasibility of conducting research from a distance, as well as with programs with which it was necessary to establish a new working relationship. These feasibility studies are described in detail in the remainder of this section.

Salt Lake City Feasibility Study

The purpose of this study was twofold: it was an investigation of the effects of two levels of parent participation with their handicapped preschool-aged children's special education programs; and it served as a test of the feasibility of several research strategies under consideration for the 16 longitudinal studies to be conducted during the next four years. Specifically, aspects of the study regarding recruitment and assignment of subjects to groups, data collection, instrumentation, treatment verification, and attrition, were examined as part of the feasibility activities.

Subjects and Treatment Settings

This study was conducted in cooperation with two community based non-profit agencies (Developmental Disabilities Inc., and Jordan Valley Child Development Center) which annually serve approximately 350 handicapped children birth through five years of age in the greater Salt Lake City, Utah area. Subjects participating in the research included 51 moderately and severely handicapped children and their parents. The children's mean age at the beginning of the intervention (January, 1986) was 48.7 months (the range was 30 - 64 months). Handicapping conditions of the children included various types of physical and mental disabilities; many were multi-handicapped. Children's mean pretest Stanford-Binet IQ was 67.5 and their mean pretest Battelle Developmental Inventory Age Equivalent Score was 26.08.

Treatment Program

Basic services to children. Children from both the experimental and comparison group received the same basic educational services during the program year. All children were enrolled in a half-day, five-day-per-week center-based intervention program in which they received small group and individualized teaching sessions from certified special education teachers and trained paraprofessional aides. Certified therapists provided individual motor and speech/language instruction to the children and helped teachers implement appropriate activities in these and other developmental areas. Children were grouped into classrooms based on level of developmental functioning and the average number of children per classroom was 9.75. During a typical day, children were instructed in developmental areas such as motor, speech/language, self help, cognitive, and social skills. As part of these basic services to children, parents were involved in IEP meetings, and teachers occasionally talked individually to parents

regarding their child's program as they were dropping children off or picking them up from the preschool.

Parent training group. The experimental treatment (independent) consisted of an intensive parent training intervention which was added to the center-based program for half of the participating parents. The parent training component was based on the PIE (Parents Involved in Education) training package (Pezzino & Lauritzen, 1986) which is designed to improve parents' skills in teaching their children. Specifically, the PIE training modules, which were taught by the preschool teachers, were designed to provide parents with a systematic conceptual and hands-on experience in areas such as child development, observation and recording, targeting intervention behaviors, teaching processes, decision making, and communicating with professionals. The training format consisted of small group lecture, discussion, and demonstration. The average small group size was 6 parents. All parents who participated were mothers. The training sessions took place over a period of approximately 20 weeks during which parents received instruction for approximately a 90-minute session one time per week. In addition to the parent training sessions, parents were instructed to complete home assignments and to implement the teaching strategies at home with their children. Although the small group sessions provided an opportunity to share both intervention-related experiences and other experiences and concerns regarding their lives, the PIE training program was not specifically designed to provide an emotional, resource, or other family support function per se.

Non-parent training group. Children in the non-parent training group received the basic center-based program but their families did not participate in the PIE training.

Experimental Procedures

Research questions. The goal of this research study was to determine the impact of adding a structured parent involvement program to an existing center-based early intervention program which provided minimal parental involvement. The following research questions were addressed. Based on a comparison of two groups of children, one receiving a center-based intervention program and a structured parent involvement component, and the other the same center-based intervention program but without structured parent involvement component: (1) Do the two conditions result in different effects on children's developmental progress? and, (2) Do the two conditions result in different effects for the families of these children?

Experimental design. A true experimental design in which children were randomly assigned to either the parent training or non-parent training group was employed. Prior to random assignment, children were stratified within classrooms based on chronological age and performance on developmental pre-test measures. As indicated in Table II.1, these procedures resulted in division of the sample of children and parents into two groups who were very comparable.

Data collection. A battery of pre- and posttest measures were administered in order to assess the effect of the experimental conditions on child and family functioning; and, to assess the feasibility of their use in future studies. Table II.2 lists the tests used and indicates when they were administered. All standardized, individually administered tests (Battelle Developmental Inventory, Minnesota Child Development Inventory, Sequenced Inventory of Communication Development, Stanford-Binet, Bayley Scales) were administered by trained qualified examiners who were blind to subject assignments. The same examiners who administered pretests also administered posttests. As a quality control measure, approximately 10% of individually administered tests were "shadow scored" and all of the

Table II.1

Subject Data by Group Prior to Treatment Onset

	Parent Training Group	Non-Parent Training Group
Mean Age (mos) (December, 1985)	46.04 (9.78) n = 26	46.84 (8.11) n = 25
[1]Stanford-Binet IQ	67.88 (17.66) n = 16	71.00 (17.84) n = 14
[1]Bayley Infant Develoment Scales Age Equivalent Scores	20.20 (4.02) n = 9	19.27 (6.05) n = 14
Battelle Developmental Inventory Age Equivalent Scores	26.12 (9.31) n = 26	26.20 (8.69) n = 25
Sequenced Inventory of Communication Development - Receptive Language- Age Equivalent Scores	27.39 (8.65) n = 26	26.50 (9.50) n = 24
Sequenced Inventory of Communication Development- Expressive Language- Age Equivalent Scores	22.62 (10.97) n = 26	23.50 (10.57) n = 24
Sex	8 female 18 male	10 female 15 male
Mean # years of School for Mother	12.73 (1.82) n = 26	14.08 (1.98) n = 25
Mean # years of School for Father	14.46 (1.90) n = 26	14.58 (2.15) n = 25
[2]Family Income	$26,615 ($10,782) n = 26	$26,125 (10,670) n = 25

[1]Data for the Stanford-Binet and Bayley Pretest are only presented for some of the subjects because some children were functioning too high to be assessed with the Bayley or too low to be assessed with the Stanford-Binet.

Table II.2

Child and Family Outcome Measures

Instrument	Outcome Area	Adminstration	Time Frame
Battelle Developmental Inventory (BDI) (Newborg, Stock, Whek, Guidubaldi, & Svinicki, 1984)	General development including personal/social, adaptive, motor, communication, and cognitive.	Individually administered by a "blind" diagonostician Information obtained from direct observation of child, interview with parent, and structured testing with child.	Pre- and Posttest
Minnesota Child Development Inventory (MCDI) (Ireton & Thwing, 1974)	Standardized measure of general development includes motor, language, comprehension, conceptual, situation comprehension, self-help, and personal/social subtests.	Interview with mother based on mother's observations.	Pre- and Posttest
Sequenced Inventory of Communication Development (SICD)	Receptive and Expressive Language	Individually administered to child by "blind" professional examiners.	Pretest only
Stanford-Binet Intelligence Scale	General cognitive functioning.	Individually administered by "blind" examiners to each child.	Pretest only
Bayley Infant Scales of Development	General developmental functioning.	Individually administered by "blind" examiners to each child.	Pretest only
Parenting Stress Index (Abidin, 1983)	Stress and coping.	Self-report measure by parent.	Pre- and Posttest
Family Support Scale (Dunst, Jenkins, & Trivette, 1984)	Social support.	Self-report survey by parents.	Postcest only

Table 2 continued

Instrument	Outcome Area	Adminstration	Time Frame
Family Resource Scale (Leet & Dunst, 1985)	Assessment of available resources to family.	Self-report by parents.	Posttest only
Impact on Family Scale (Stein & Riessman, 1978)	Stress and coping.	Self-report by parents.	Posttest only
Family Adaptability and Cohesion Evaluation Scales (Olsen, Portner, & Lavee, 1985)	Assessment of general family functioning.	Self-report by parents.	Posttest only
Child Improvement Locus of Control Scales (DeVellis, Reviecki, & Bristol, 1984)	Parental attitudes and expectations.	Self-report by parents.	Posttest only
Family Inventory of Life Events and Changes (McCubbin, Patterson, & Wilson, 1983)	Assesses general family functioning.	Self-report by parents.	Posttest only
Home Screening Questionnaire (JFK Child Development Center, 1981)	Assesses family resources.	Self-report by parents.	Posttest only
Home Observation Checklist (Caldwell & Bradley, 1979)	Assesses home resources.	Interview individually at each parent's home.	Posttest only
Parent Satisfaction Questionnaire (Self-made)	Parental attitudes and expectations.	Self-report by mothers.	Posttest only
IEP Objectives Achieved	Child progress.	Teacher reported.	Posttest only
Family Environment Scale (Moos, 1974)	General family functioning.	Self-report by parents.	Posttest only

individually administered tests were independently checked for scoring and computational accuracy.

Results

Pre/posttest gains within groups. Correlated t-Tests were used to test the statistical significance of the pre/posttest gain scores for the BDI, the MCDI and the Parenting Stress Index (PSI), in each of the experimental conditions. As indicated in Table II.3, both the parent training group children and the non-parent training group children demonstrated statistically significant gains based on their pretest to posttest Battelle Age Equivalent Scores and on their MCDI Age Equivalent Scores. According to BDI total results, children in the parent training group progressed an average of 5.48 months during the 5-month treatment period and according to the MCDI General Development Scale, they progressed an average of 5.12 months during the 5-month treatment period. Based on the Battelle Age Equivalent Scores the non-parent training group children progressed an average of 4.29 months during the 5-month period and based on the MCDI they progressed an average 2.86 months.

As indicted in Table II.4, the only statistically significant ($p < .05$) pre- to posttest gains or losses on the Parenting Stress Index (PSI) summary subtests (Total Stress, Total Child, & Total Parent) were for the non-parent training group mothers which demonstrated a statistically significant reduction in stress level on the Total Child subtest.

Differences between groups on child outcomes. Analyses of covariance were used to test the effects of treatment condition on posttest scores, controlling for pretest score for the Battelle Developmental Inventory and the Minnesota Child Development Inventory. As indicated in Table II.5 and Table II.6, no statistically significant effects of treatment condition on post-test scores were found overall or in any specific area of development

Table II.3

Paired T-Tests Pre/Post Child Measure Scores for the Battelle Developmental Inventory (BDI) and the Minnesota Child Development Inventory (MCDI).

Parent Training Group					
Test	N	X	(SD)	t	Sig of t
BDI Total (Age Equivalent)					
Pre		26.84	8.72		
	25			-4.93	.0001
Post		32.32	10.32		
MCDI - General Development (Age Equivalent)					
Pre		27.13	8.38		
	24			-4.39	.0001
Post		32.25	12.29		

Non-Parent Training Group					
Test	N	X	(SD)	t	Sig of t
BDI Total (Age Equivalent)					
Pre		26.96	7.99		
	24			-4.79	.0001
Post		31.25	10.16		
MCDI General Development (Age Equivalent)					
Pre		25.50	7.80		
	22			-3.35	.003
Post		28.36	8.33		

Table II.4

Paired T-Test Pre/Post Parent Stress Index Scores (Percentiles) of Mothers

Test	N	X	(SD)	t	Sig of t
Parent Training Group					
PSI Total Stress					
Pre	25	74.12	31.27	-0.09	.93
Post		74.44	29.54		
PSI Total Child					
Pre	25	77.76	26.29	0.75	.46
Post		75.60	27.38		
PSI Total Parent					
Pre	25	66.68	31.75	-0.24	.810
Post		67.60	27.66		
Non-Parent Training Group					
Total Stress					
Pre	23	73.44	21.87	1.86	.076
Post		69.09	28.38		
Total Child					
Pre	23	81.35	19.04	2.64	.015
Post		73.26	27.52		
Total Parent					
Pre	23	59.96	22.69	-0.03	0.98
Post		60.09	28.36		

Table II.5

Means, Standard Deviations, and Analysis of Covariance F Values for Battelle Developmental Inventory DQ Test Scores

	UNADJUSTED				ADJUSTED[3]			
	Experimental[1]		Control[2]		Experimental	Control	F	Sig of F
Subtest	$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	$\bar{X}$		
Personal Social	70.00	(27.43)	68.42	(21.99)	70.69	67.69	.22	.64
Adaptive	54.28	(21.97)	58.25	(26.54)	55.09	57.41	.16	.69
Gross Motor	59.16	(28.97)	55.33	(38.18)	59.86	54.60	.33	.57
Fine Motor	64.64	(22.28)	65.38	(21.78)	64.37	65.66	.13	.72
Total Motor	56.08	(26.39)	51.88	(33.28)	57.09	50.83	.76	.39
Receptive Communication	61.88	(21.56)	67.50	(20.75)	62.71	66.63	.73	.40
Expressive Communication	63.72	(19.01)	68.00	(17.76)	64.35	67.34	.47	.50
Total Communication	59.52	(21.85)	64.13	(20.58)	60.32	63.30	.39	.54
Cognitive	61.56	(26.82)	63.63	(21.54)	62.29	63.87	.07	.80
Total BDI	52.08	(23.60)	51.29	(28.13)	53.13	50.20	.28	.60

[1]Experimental connotes the parent training group

[2]Control connotes the non-parent training group

[3]Each BDI subtest was controlled with its respective pretest

Table II.6

Means, Standard Deviations, and Analysis of Covariance F-Value for Minnesota Child Development Inventory Age Adjusted[3] Posttest Scores

	UNADJUSTED				ADJUSTED[4]			
	Experimental[1]		Control[2]		Experimental	Control	F	Sig of F
Subtest	$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	$\bar{X}$		
General Development	59.69	(17.84)	54.20	(12.69)	58.56	55.44	.66	.42
Gross Motor	53.24	(22.24)	44.84	(22.19)	50.73	47.58	1.11	.30
Fine Motor	67.50	(19.46)	64.38	(22.08)	66.70	65.25	.06	.81
Expressive Language	56.21	(17.94)	52.32	(14.21)	55.74	52.84	.37	.55
Comprehension Conceptual	60.23	(17.49)	60.77	(19.45)	59.83	61.20	.06	.80
Situation comprehension	65.59	(23.80)	55.96	(15.10)	64.93	56.70	1.98	.17
Self Help	66.14	(21.52)	58.88	(16.12)	64.60	60.56	.83	.37
Personal Social	55.74	(13.26)	54.68	(20.29)	54.81	55.70	.04	.85

[1]Experimental connotes the parent training group

[2]Control connotes the non-parent training group

[3]Age adjusted scores were calculated as age equivalent scores divided by chronoloigcal age of child at time of testing, multiplied by 100.

[4]Each MCDI subtest was controlled with its respective pretest.

for either test. Six of the 8 MCDI means favor the experimental group and 4 of the 10 BDI means favor the experimental group. In addition, analysis of variance techniques were used to test the effects of treatment condition on posttest data regarding the number and percentage of IEP objectives achieved by children. As indicated in Table II.7, no statistically significant effects of treatment condition on posttest IEP data were found.

Stress and coping parent outcomes. Analysis of covariance was used to test the effects of treatment condition on posttest scores of the PSI after controlling for pretest scores. As indicated in Table II.8, no statistically significant effects of treatment condition on posttest scores were found on 16 of the 17 PSI subtests. PSI scores on the Demandingness subtest, however, indicated a statistically significantly lower level of stress for the non-parent training group mothers. However, unless this finding were replicated in other studies, the most compelling conclusion would be that this was a chance finding given the fact that so many tests of statistical significance were computed.

Analysis of variance was used to test the effects of treatment condition on posttest scores for the Impact on Family scale. As indicated in Table II.9, no statistically significant effects of treatment on posttest scores were found on the total score or any of the subtest scores.

General family functioning outcome measures. Analysis of variance was used to test the effect of treatment condition on posttest scores for the Family Adaptability and Cohesion Evaluation Scales III, the Family Inventory of Life Events and Changes scale, and the Family Environment Scale. As indicated in Tables II.10 and II.11 no significant effects of treatment on posttest scores were found on the FACES III or the FILE tests or subtests. As indicated in Table II.12, for 12 of the 13 FES subtests no significant effects of treatment on posttest scores were found. Statistically

Table II.7

Means, Standard Deviations, and Analysis of Variance F-Values for I.E.P. Objectives Data

	UNADJUSTED				F	SIG OF F
	Experimental[1]		Control[2]			
Subtest	X	(SD)	X	(SD)		
#IEP Objective Set	28.36	(14.72)	31.50	(17.45)	.46	.50
#IEP Objective Achieved	16.24	(10.89)	15.48	(9.62)	.07	.80
Total Percentage of IEPs achieved	52.28	(20.22)	49.71	(16.35)	.23	.63

[1]Experimental connotes the parent training group.

[2]Control connotes the non-parent training group.

Table II.8

Means, Standard Deviations, and Analysis of Covariance F Values for Parenting Stress Index Percentile Scores

Subtest	UNADJUSTED Experimental[1] $\bar{X}$	(SD)	Control[2] $\bar{X}$	(SD)	ADJUSTED[3] Experimental $\bar{X}$	Control $\bar{X}$	F	Sig of F
Total Stress	74.44	(29.54)	69.09	(28.38)	74.14	69.41	1.19	.28
Total Child	75.60	(27.38)	73.26	(27.52)	77.33	71.38	1.96	.17
Adaptability	66.60	(29.63)	61.57	(32.84)	65.96	62.26	.30	.59
Acceptability	81.60	(24.62)	82.43	(23.44)	84.39	79.41	.73	.40
Demandingness	79.68	(23.70)	74.30	(24.79)	83.05	70.64	6.22	.02
Mood	71.12	(24.37)	67.26	(27.88)	70.10	68.37	.10	.75
Distractability/ Hyperactivity	64.84	(31.61)	66.83	(28.32)	66.54	64.98	.05	.83
Reinforces Parent	67.96	(23.88)	65.57	(29.45)	66.42	67.24	.02	.90
Total Parent	67.60	(27.66)	60.09	(28.35)	65.12	62.78	.19	.66
Depression	57.84	(26.60)	56.04	(31.49)	57.25	56.68	.01	.93
Attachment	68.56	(24.42)	61.70	(28.49)	66.73	63.68	.17	.69
Restrictive Role	64.96	(31.77)	54.87	(30.92)	65.17	54.64	2.40	.13
Sense of Competence	64.40	(22.51)	57.57	(27.56)	63.03	59.06	.54	.47
Social Isolation	58.40	(27.68)	60.96	(28.54)	56.96	62.53	.87	.36
Relationship Spouse	68.16	(25.72)	61.65	(26.27)	66.44	63.52	.29	.59
Parent Health	73.60	(24.47)	66.83	(26.36)	70.85	69.82	.03	.87
Life Stress	16.00	(8.66)	17.87	(15.24)	16.24	17.61	.26	.61

[1]Experimental connotes the parent training group.
[2]Control connotes the non-parent training group.
[3]Each PSI subtest was controlled with its respective pretest.
NOTE: A higher score indicates more stress.

Table II.9

Means, Standard Deviations, and Analysis of Variance
F Values for Impact on Family Posttest Scores

Subtest	UNADJUSTED Experimental[1] $\bar{X}$	(SD)	Control[2] $\bar{X}$	(SD)	F	Sig of F
Total Score	44.48	(8.60)	40.29	(7.00)	3.48	.07
Sibling Score	12.94	(2.54)	11.40	(3.44)	2.33	.14
Stress Factor	23.56	(4.86)	21.25	(3.15)	3.86	.06
Familial/Social Factor	19.48	(3.90)	17.42	(3.79)	3.53	.07
Coping Factor	7.64	(1.47)	7.63	(2.24)	.00	.98
Financial Factor	6.84	(1.49)	6.92	(2.17)	.02	.89

[1]Experimental connotes the parent training group.
[2]Control connotes the non-parent training group.
NOTE: A higher score means more negative impact.

Table II.10

Means, Standard Deviations, and Analysis of Variance F Values for Family Adaptability and Cohesion Evaluation Scale (FACES)

	UNADJUSTED					
	Experimental[1]		Control[2]		F	Sig of F
Subtest	$\bar{X}$	(SD)	$\bar{X}$	(SD)		
Perceived	63.36	(7.15)	67.04	(7.87)	2.94	.09
Ideal	75.92	(8.48)	78.83	(5.58)	2.00	.15
Discrepancy (Ideal-Perceived)	12.56	(9.84)	11.79	(7.75)	.09	.76
Cohesion	39.88	(5.51)	41.21	(4.71)	.82	.37
Adaptability	23.48	(4.57)	25.83	(3.85)	3.78	.06

[1]Experimental connotes the parent training group.
[2]Control connotes the non-parent training group.

Table II.11

Means, Standard Deviations, and Analysis of Variance F Values for Family Inventory of Life Events and Changes (FILE)

	UNADJUSTED					
	Experimental[1]		Control[2]		F	Sig of F
Subtest	$\bar{X}$	(SD)	$\bar{X}$	(SD)		
FILEIFS	4.40	(3.10)	5.42	(3.09)	1.32	.26
FILEMS	.52	(1.26)	.46	(1.10)	.033	.86
FILEPCS	.16	(.37)	.13	(.34)	.12	.73
FILEFBS	2.80	(1.85)	2.75	(1.54)	.01	.91
FILETRS	2.16	(1.77)	1.58	(1.38)	1.61	.21
FILEIC	1.12	(1.30)	.96	(1.30)	.19	.67
FILELO	.24	(.52)	.38	(.71)	.58	.45
FILET	.04	(.20)	.17	(.48)	1.47	.23
FILEPAS	11.20	(5.86)	11.63	(5.73)	.07	.80
FILEPR	2.69	(2.09)	3.71	(3.47)	.99	.33

[1]Experimental connotes the parent training group.
[2]Control connotes the non-parent training group.
NOTE: A higher score means more stress-related events or changes.

Table II.12

Means, Standard Deviations, and Analysis of Variance
F Values for Family Environment Scale (FES)

Subtest	UNADJUSTED Experimental[1] $\bar{X}$	(SD)	Control[2] $\bar{X}$	(SD)	F	Sig of F
Relationships	16.56	(3.08)	17.50	(2.43)	1.40	.24
Personal Growth	28.80	(5.56)	29.71	(8.48)	.20	.66
System Maintenance	12.04	(2.21)	10.83	(2.73)	2.90	.10
Cohesion	7.24	(1.64)	7.21	(1.82)	.00	.95
Expressiveness	5.52	(1.87)	6.08	(1.69)	1.22	.28
Conflict	3.80	(1.91)	4.21	(1.91)	.56	.46
Independence	6.40	(1.61)	5.67	(1.83)	2.22	.14
Achievement	5.92	(1.15)	5.50	(1.62)	1.11	.30
Intellectual/Cultural	5.48	(2.02)	5.92	(2.41)	.47	.50
Active/Recreational	4.20	(1.94)	5.67	(2.28)	5.91	.02
Moral/Religious	6.80	(2.12)	6.96	(2.26)	.06	.80
Organization	6.28	(1.57)	6.04	(2.16)	.20	.66
Control	5.76	(1.48)	4.79	(1.96)	3.84	.06

[1]Experimental connotes the parent training group.
[2]Control connotes the non-parent training group.
NOTE: A higher score indicates more of factor.

significant differences were found, however, on the FES Active/Recreational subtest, indicating that the non-parent training group had statistically significantly more recreational opportunities than did the parent training group. However, given the number of statistical tests computed this is probably also an artifact.

Social support and resources outcome measures. Analysis of variance was used to test the effects of treatment condition on posttest scores for the Family Resource Scale (FRS), the Family Support Scale (FSS), and the Home Screening Questionnaire (HSQ). As indicated in Tables II.13, II.14, and II.15, no statistically significant effects of treatment on posttest scores were found in any of these measures or their subscales.

Parental knowledge, attitudes, and expectations. Analysis of variance was used to test the effects of treatment conditions on posttest scores for Locus of Control. No statistically significant effects of treatment on posttest scores were found on this test or any of its subtests (see Table II.16).

Analysis of covariance (controlling for a mother's education level) was used to test the effects of treatment condition on posttest scores for the Parent Satisfaction Questionnaire. As indicated in Table II.17, no statistically significant effects of treatment on posttest scores were found on this test or any of its subtests. However, as indicated by the scores on the 5-point scale (with 5 being high), parents in both programs were very satisfied with what they received.

Analysis of covariance (controlling for mother's education level) was used to test the effects of treatment condition on posttest scores for the thirteen item Parent Knowledge Questionnaire. The total Parent Knowledge Questionnaire scores were statistically significantly higher for the parent training group ($F = 19.15$, $df = 1,47$; Effect size = 1.14) than the non-

Table II.13

Means, Standard Deviations, and Analysis of Variance F Values for Family Resource Scale (FRS)

Subtest	UNADJUSTED Experimental[1] $\bar{X}$	(SD)	Control[2] $\bar{X}$	(SD)	F	Sig of F
General Resources	67.33	(13.77)	70.30	(19.61)	.14	.71
Time Availability	40.32	(11.73)	40.88	(11.80)	.03	.87
Physical Resources	27.30	(5.60)	27.30	(5.73)	.00	1.00
External Support	20.00	(4.05)	19.90	(7.61)	.00	.93

[1]Experimental connotes the parent training group.
[2]Control connotes the non-parent training group.

Table II.14

Means, Standard Deviations, and Analysis of Variance F Values for Family Support Scale (FSS)

Subtest	UNADJUSTED Experimental[1] $\bar{X}$	(SD)	Control[2] $\bar{X}$	(SD)	F	Sig of F
Total (Mother)	31.32	(7.06)	32.67	(14.34)	.13	.68
# Sources Support Availability (Mother)	14.76	(3.35)	15.83	(3.17)	1.33	.25
Total (Father)	29.05	(8.17)	30.10	(8.09)	.17	.69
# Sources Support Availability (Father)	16.00	(2.43)	14.95	(2.61)	1.74	.20

[1]Experimental connotes the parent training group.
[2]Control connotes the non-parent training group.

Table II.15

Means, Standard Deviations, and Analysis of Variance F Values for Home Screening Questionnaire (HSQ)

Subtest	UNADJUSTED Experimental[1] $\bar{X}$	(SD)	Control[2] $\bar{X}$	(SD)	F	Sig of F
Questions	28.64	(4.41)	29.38	(4.63)	.32	.57
Toy Checklist	11.64	(2.45)	12.58	(1.82)	2.33	.13
Total	38.80	(9.05)	41.92	(6.00)	2.00	.16

[1]Experimental connotes the parent training group.
[2]Control connotes the non-parent training group.

Table II.16

Means, Standard Deviations, and Analysis of Variance
F Values for Locus of Control

Subtest	UNADJUSTED Experimental[1] $\bar{X}$	(SD)	Control[2] $\bar{X}$	(SD)	F	Sig of F
Professional Intervention	23.96	(3.59)	25.33	(5.54)	1.07	.31
Divine Intervention	14.08	(4.74)	12.67	(4.53)	1.13	.29
Parent Intervention	28.60	(3.54)	28.67	(4.67)	.00	.96
Child	23.24	(5.17)	22.65	(5.86)	.14	.71
Chance	11.12	(4.23)	9.42	(4.46)	1.88	.18

[1]Experimental connotes the parent training group.
[2]Control connotes the non-parent training group.

Table II.17

Means, Standard Deviations, and Analysis of Co-Variance F Values for Parent Satisfaction Questionnaire (PSQ)

Subtest	UNADJUSTED Experimental[1] $\bar{X}$	(SD)	Control[2] $\bar{X}$	(SD)	F	Sig of F
Total	24.96	(3.08)	24.54	(3.46)	3.14	.08
Quality of Services	4.32	(.80)	4.33	(.76)	.00	.95
Programs for Parents	3.72	(.84)	3.71	(.75)	.18	.67
Accessibility of Staff	4.32	(.75)	4.25	(.74)	.18	.67
Activities for Children	4.20	(.58)	4.33	(.96)	1.85	.18
Parent Participation in Child's Program	4.00	(.76)	3.88	(.90)	.01	.94
General Satisfaction with Intervention	4.36	(.70)	4.21	(.83)	.00	.96

[1]Experimental connotes the parent training group.
[2]Control connotes the non-parent training group.

parent training group. These data suggest that parents in the training group did master the knowledge that was presented as a part of the training.

Discussion

The results of this feasibility study are important in two ways. First, the study provides information which is useful in finalizing the plans for the longitudinal studies to be initiated next October. Secondly, the findings are important in their own right as information about the effect of involving parents more extensively in a relatively intensive center-based early intervention program. Conclusions in each of those areas are presented below.

Implications for Longitudinal Studies

Results of the Salt Lake City feasibility study have a number of implications for how the 16 longitudinal studies will be conducted. The most important of these are summarized below.

Assignment of subjects to groups. The strategy employed for assigning subjects to groups on a random basis after stratification within classrooms by chronological age and performance on developmental pretest measures was successful. As indicated earlier in Table II.1, even though these were relatively small groups of considerable heterogeneity, the assignment procedures resulted in groups that were very comparable across a wide range of variables (e.g., sex, number of years of school for mother and father, and family income). After parents were informed about the group to which they had been assigned, none decided to discontinue their participation in the study. This may have been due to several factors including a careful explanation of the purpose of the study to the parents indicating that they would be making a contribution the field regardless of which group they were assigned, and the fact that they were getting just as much service in the control group as they would if they did not participate in the research.

Attrition. The strategies in this study that were used to reduce attrition were successful. Only two subjects were lost over the course of a five-month study. One subject was lost because the family moved out-of-state and one subject was lost because the parents indicated that they were no longer interested in participating. The reasons for the relatively low level of attrition are probably due to several factors including: (1) parents were fully informed regarding their roles and responsibilities as participants, (2) there was ongoing communication with the parents throughout the course of the study, and (3) a $40.00 monetary parental incentive was provided for the completion of pre- and posttest self-report measures. Parents indicated, in unsolicited comments, that they were very happy to receive this monetary incentive because it covered the costs of extra travel and babysitting.

Data collection. Data collection efforts were very successful, especially considering the number and type of different data that were collected. As indicated in the previous section, some data collection efforts were facilitated by the use of parent incentives. Other strategies which facilitated data collection efforts included: 1) the exclusive use of competent, well-trained individual test administrators; 2) the use of shadow scoring on a percentage of the individually administered standardized tests; 3) a verification and checking procedure regarding computations and interpretations of test items; 4) a good deal of coordination and planning which helped facilitate a smooth scheduling of parents, children and teachers; and, 5) a phone call follow up procedure for the collection of missing or late data.

Effects of Adding a Parent Involvement Component to a Center-based Program

Pre- and posttest gain scores on the BDI and MCDI suggest that the basic intervention program was quite effective for both groups of children.

Considering the mean IQ/DQ for all subjects was over two standard deviations below the mean, developmental age equivalent gains of 5.48 months (BDI) and 5.12 months (MCDI) in the parent training group is indicative of accelerated developmental progress. Although not as impressive as the parent training group, the children in the non-parent training group also demonstrated positive developmental gains during the five month period. Based on their BDI Scores, these children progressed an average of 4.29 months and based on their MCDI General Development Scores, they progressed and average of 2.86 months. With the exception of the Parent Knowledge Survey which was based on the PIE training materials, the child progress and the family outcome measure exhibited virtually no statistically significant differences between the two groups. The lack of statistically significant group differences suggests that the parent training treatment may not have been effective as it was implemented in this study.

The lack of effect in child or family functioning attributable to the parent training component may be due to several factors. First, because the parent training was added to what appears to have been a highly effective center-based intervention program, any impact that the parent training had may have been masked. Second, given the nature of the independent variable, that is a treatment that was designed to increase parents' skill level in teaching their children, its not surprising that no differences were found on those measures which were designed to assess areas other than child progress. Third, the intervention program may not have lasted long enough. A fourth explanation for the lack of differences may be that only mothers were involved in the parent training sessions and that in order for the family outcomes to be differentially affected, other family members would have had to participate.

A fifth possibility for lack of differences is that the parent training program was only effective with those parents who fully participated in the parent training. In order to test this hypothesis, analyses were conducted using data only from parents who had at least an 88% parent training attendance rate and who were rated as having a "high degree of participation" by their respective parent trainers. This procedure resulted in an analysis consisting of 10 "highly participating, high attending" parents compared with the non-parent training group. Results from this analysis for the Minnesota Child Development Inventory, the Battelle Development Inventory, the Family Support Scale, the Parent Stress Inventory, the Parent Knowledge Survey, the IEP data, the Locus of Control, and the Home Screening Questionnaire were not any different from analyses conducted with the full experimental group. These results also suggest several directions for conducting future research, for example, it seems reasonable that in addition to a comparison of parent training versus no parent training, a third type of parent involvement needs to be explored, that is, parent involvement which focuses on emotional and "network" support for parents. There were some indications in these data that, in fact, the parent training group's stress level was actually higher than the non-parent training group's. This may not be unreasonable considering that the parent training may have sensitized parents to their child's developmental delay and by implication placed additional pressure and responsibility on them to remediate it.

The lack of statistically significant differences in this study is interesting for a number of reasons. First, based on our review of over 300 previous early intervention efficacy studies (White & Casto, 1985) we have identified approximately 125 previous studies (67 with handicapped children, and 58 with disadvantaged and at-risk children) in which parents were

moderately to heavily involved. The parent involvement procedures used in this study were just as intensive or more so than the typical study reported previously; procedures were more carefully implemented (e.g., there were systematic efforts in this study to determine participation rates and whether parents actually implemented the programs; whereas in previous research such efforts are almost never reported); and the type of parent involvement was similar to that used in the vast majority of previous research. Secondly, although most early intervention professionals assume that parent involvement leads to more effective intervention programs (e.g., Bronfenbrenner, 1977, Goodson & Hess, 1975) there is as yet, very little if any empirical support for this position. The fact that the results of this study are similar to the empirical results of the review of parent involvement studies reported by Casto & Lewis (1984), but at odds with the prevailing attitude among early intervention professionals suggests that this is an important area for further investigation.

Illinois Feasibility Studies

In the spring of 1985, the Illinois State Board of Education distributed a Request for Proposals (RFP) for funding pilot programs for handicapped and at-risk children between birth and three years of age. The purpose of this RFP was to determine the feasibility and cost-effectiveness of mandating early intervention services for handicapped and at-risk children below age three. The staff of the Early Intervention Research Institute worked closely with the Illinois State Board to develop an RFP which would foster the empirical examination of the effectiveness of the expanded programs being proposed. Since each proposal was required to propose an evaluation plan as a part of their project, offerers were given the option of cooperating with Early Intervention Research Institute to conduct the efficacy research for their project, if the project was designed

so that it conformed with the requirements for the Early Intervention Research Institute longitudinal research. As a result, when proposals were funded under the state program, each presented a method for evaluating the impact of expanding services for young handicapped children and specified whether or not the program wished to work in collaboration with the longitudinal studies of the Early Intervention Research Institute. Five programs opted to work with the institute. One program, however, was working with high-risk infants, and thus could not be included as an Early Intervention Research Institute feasibility study. A second program, Citizens for the Disabled, proposed a study which did not involve random assignment. However, Early Intervention Research Institute staff worked with the director of this project to develop a program in which children would be randomly assigned to treatment or no treatment conditions. It was determined, however, that this project would operate for one year with only technical assistance from the institute, and would not participate as a feasibility study during the base period year.

Description and Status of Projects

The three projects which were selected to work with EIRI were subsequently contacted, and the design of their studies was further clarified. Additional contacts with each site further solidified the research design and details of the research project. Below is a description of each of the projects which served as feasibility studies during the base period year.

SMA/Lake McHenry Region Project. The SMA (South Metropolitan Association)/Lake McHenry project is located in the northern and southern suburbs of Chicago. It is a collaborative project between two early intervention programs, each of which serves a large number of children. Current services in the programs are very similar, i.e. once a week services

provided to children and their families. These services involve a direct individual contact between the child, the child's parents, and a parent-infant educator. The proposed study will look at the efficacy of the current once per week services in comparison to an expanded program in which children receive services three times per week.

There are currently 24 children who are participating as subjects and have been assigned to either the experimental (three times per week) or control (one time per week) groups. Two additional children, a set of twins, were entered as subjects but withdrew from the study after being institutionalized. Random assignment occurs on a continuous basis; handicapping condition (which takes into account severity of delay) and parental stress are the stratification variables. The mean age of the subjects is 11 months, while their mean rate of development as assessed by the Wisconsin Behavior Rating Scale is .45. Three children are hearing impaired (2 with normal developmental skills, one with a moderate developmental delay), 14 are moderately handicapped, and 7 are severely handicapped.

Identification of subjects progressed slowly during the months of January and February as the programs attempted to develop screening procedures and the flow of paperwork was worked out. At the present time, however, subjects are being identified at the rate of 8-10 per month. Site visits to the program have been conducted to monitor treatment implementation as well as to train diagnosticians. Posttest data are being collected on ten children who have been in the programs for at least three months. One "blind" diagnostician will do the testing, and data will be analyzed when it is complete. The Battelle Developmental Inventory, Parenting Stress Index, Family Resource Scale, and Family Support Scale are being administered.

Wabash and Ohio Valley Special Education District. This project is located in the Southeastern section of Illinois. Two types of services are currently available. The first is a home-based program provided by the Division of Mental Health in which families are visited once each week and provided with general support and assistance. The second is a newly implemented center-based program operated by the Wabash and Ohio Valley Special Education District. The center-based program provides much more structured services and operates five days per week for 2-1/2 hours per day. This is a rural area, and the center-based programs operated by this project are in two separate counties. Children in the center-based program are thus assigned to the program which is geographically most accessible.

The comparison of interest is to examine the effectiveness of beginning intensive center-based intervention services before age three, versus after age three. Children are thus identified prior to age three and assigned to receive either the current once per week services provided by the Division of Mental Health, or the new 5-day per week, 2-1/2 hour per day center-based program.

There are currently 25 children who are participating as subjects and have been assigned to either the intensive or less intensive groups. Assignment to groups is conducted on a continuous basis as children are identified; age and developmental level are the stratification variables. The mean age of the subjects is 26.3 months; their mean age equivalent on the Battelle Developmental Inventory is 21 months. The subjects thus represent a range of delay from mild to severe. Site visits to the program have been conducted to monitor treatment implementation as well as to train diagnosticians. Posttest data are currently being collected by "blind" diagnosticians on 21 children who have been in the programs for at least one month. The Battelle Developmental Inventory, Parenting Stress Index, Family

Resource Scale, and Family Support Scale are being administered. These data will be analyzed when all testing is completed.

3. C.I.R.C.L.E.S. This project is located in west central Illinois, and involves a consortium of two agencies serving children between birth and age three. One agency, located in Charleston, provides once per week home-based services. A second program, located in Effingham, Illinois, provides center-based services which vary in duration from one to five times per week. Each agency has been assigning children to one of two groups: the first to receive the current child-centered services; and the second to receive the child-centered services plus an added family involvement component.

While this program initially appeared to have a large number of potential subjects (based on the number of children currently being served), it became clear after the project was initiated that many were not clearly handicapped. This reduced the subject pool to 24 - 30 children from Charleston, and 12 from Effingham. At the time of assignment to groups, the mean age of these subjects was 18 months, while their mean Bayley MDI Score was 53.7. Site visits were made to the program to finalize the research design, monitor treatment implementation, and train diagnosticians.

In the course of working with this program, a number of difficulties arose which resulted in the research design being severely compromised. In the Effingham program, the family involvement component was never implemented, while in Charleston it was implemented at a very minimal level. Upon review by the Illinois State Board monitoring team, it was decided that funding for this project would not be renewed.

Posttest data are being collected, however, on the 30 children in the Charleston program who were randomly assigned to either the experimental (home-based services plus parent involvement) or control (home-based services only) groups. The Battelle Developmental Inventory, Parenting Stress Index, Family Resource Scale, and Family Support Scale are being administered by trained diagnosticians. These data will be analyzed when all testing is completed.

Implications of the Illinois Feasibility Studies

The Illinois feasibility studies provided the institute with a great deal of valuable information which will be useful in conducting the remainder of the 16 longitudinal studies.

Incidence figures. First of all, the feasibility studies provided a good picture of how easy it is to overestimate the number of potential subjects available for any particular project. For example, incidence figures in the Wabash & Ohio Valley Project, based on the number of children being served in the school district, suggested that there would be no difficulty identifying a sufficient number of children. However, because these incidence figures included a large number of handicapped children who are not identified until they are of school age (e.g. learning disabled and speech impaired students), the actual incidence of identifiable handicapping conditions in the 0 - 3 age range was much lower. Related to this problem was the fact that it took a lot longer than expected for the program to establish their screening procedures, and thus the flow of subjects was very slow in the first few months of the project. This suggests that the length of time that it takes for a program to get geared up for the study will greatly affect the rate at which subjects are identified.

Frequency of contact with sites. A second issue which became quite clear as a result of these feasibility studies is that frequent contact with

programs is extremely important. This was especially true with the C.I.R.C.L.E.S. program where a breakdown in the project occurred as a result of internal conflicts between the collaborating agencies. While it will not always be possible to prevent such problems from occurring, frequent contact ensures that all relevant information is obtained.

Interest by service agencies in research. The feasibility studies indicated that programs are very willing to work with the Early Intervention Research Institute and can provide appropriate comparisons. Project staff were receptive to input from the institute and were flexible in accommodating procedures necessary to ensure the integrity of the research design. While many program staff did not have extensive research backgrounds, most understood the necessity of conducting a well-designed study and were accepting of procedures which in many instances proved to be quite time consuming for them.

Recruitment, training, and monitoring of diagnosticians. Identification and training of diagnosticians also went smoothly. Program staff in all three studies identified appropriate diagnosticians who were external to the project, most of the diagnosticians identified had at least a master's degree, and all had teaching experience with young handicapped children or were experienced testers. EIRI staff conducted training sessions on the Battelle, and all diagnosticians were required to conduct practice assessments before collecting data. While the training sessions appeared to be adequate, some modifications will be necessary. In addition, there were some indications that monitoring of diagnosticians should be done more thoroughly and frequently. Procedures for this purpose will be developed.

Random assignment. Random assignment of subjects was also found to be implemented without difficulty. While in many cases program staff anticipated difficulties in getting parents to agree to random assignment,

they actually encountered few difficulties, and once parents were assigned to a group they remained there. It became clear, however, that control of random assignment must be maintained by EIRI staff, as there is occasionally the tendency for programs to be less than stringent in this regard. For example, in one program, program staff wanted to include two children in the experimental group because they were concerned that the parent might object to random assignment. By maintaining control of random assignment procedures, EIRI staff can prevent problems from occurring.

Attrition. Attrition across these studies was relatively low. Attrition that did occur was the result of circumstances which were not associated with the research project. For example, in the SMA/Lake McHenry study the only attrition which occurred was due to institutionalization of two subjects. In the C.I.R.C.L.E.S. program, attrition occurred as the result of children moving from the area, and in two other instances children passed away.

The Illinois feasibility studies thus provided a great deal of information which will be useful for conducting the longitudinal studies. Although some problems were identified, the feasibility of conducting the research with procedures as planned was supported.

III. SITE SELECTION

The way in which the Department of Education Contract was written affected the site selection process in the following ways:

- The scope and complexity of the proposed workscope, and the fact that the RFP required that the research take place in "typical service settings," virtually mandated that the research be done in collaboration with a number of different service providers. It was felt that to be successful, those service providers collaborating with the institute should have a history of successfully providing early intervention services so that the results of the research would not be confounded with the "start up" problems which typically accompany new programs.

- Three general questions were stipulated in the RFP. Because of our belief that successful field-based research depends on the interests and commitment of the service provider to the research question being pursued, we limited the recruitment of collaborators to those people who were genuinely interested in one of the questions addressed by this workscope. In other words, it is our belief that field-based research which imposes the question being researched on an uninformed, uninterested, or even unwilling service provider is doomed to failure.

- Not only was there not enough money in the contract to pay for the provision of services, but the RFP stipulated that the money in this contract must be devoted to actually conducting the research. Because virtually all of the questions being addressed by this research required the comparison of two different levels of services, it was necessary to identify collaborators who were either already offering such alternative intervention programs and were willing to randomly assign subjects to them, or who are now offering one level of program and were willing to develop a more intensive or expanded version of intervention services. In those cases where the development of expanded services was necessary, potential collaborators had to be identified who either had access to additional funding or were willing to work with the institute in obtaining the additional funds necessary to provide the expanded services.

- The writers of RFP 84-104 wisely stipulated the each of the 16 studies abide by certain conditions in order to ensure unequivocal findings (e.g., random assignment to groups, verification of treatment implementation, cost analysis, collection of valid measures of impact on children and families). Thus, it was necessary to identify sites who were willing to abide by these conditions, and allow the research staff to verify that the conditions were being met.

- Although advocacy has a very important role to play in the development of early childhood special education services, it serves a different role than does research. Hence, it was necessary to identify collaborators who were willing to set aside their biases

about which form of intervention is most cost-effective and objectively examine the data over an extended period of time.

Within the constraints outlined above, it was the goal of the EIRI staff to identify the best possible sites for conducting the longitudinal research. This was the single most important task of the base period, and the one which required the greatest amount of staff time and resources. The remainder of this section describes the procedures which were used to recruit and identify potential sites, the specific criteria used in selecting sites, and the proposed sites for each of Options 1, 2, and 3.

Recruitment and Identification of Sites

Selection of sites constituted a major activity during the base period, as sites across the country were contacted by EIRI staff members to determine their interest and ability to participate in the longitudinal studies of the Early Intervention Research Institute. While many of the projects described in the original proposal have continued to be committed to collaboration with the institute, there are a number of projects which have not. During the proposal writing period, a large number of programs were contacted. The projects which were contacted indicated great interest in participating, but details regarding participation were not fully worked out at that point. As a result, during the base period year, many of the programs which had initially indicated interest found that due to the constraints outlined above, they would not be able to collaborate with the institute. During the base period year, efforts were undertaken to broaden the pool of potential research sites as per our original plan. This allowed for the selection of sites which would best meet the requirements of the longitudinal research.

A number of efforts were made to actively recruit potential research sites. All programs which had indicated an interest in the institute during the proposal writing stage were contacted again. Descriptions of the

institute were published in Preschool Interests, a newsletter published by: The National Association of School Psychologists; Zero to Three, a publication of the National Center for Clinical Infant Programs; the DEC Communicator; and the Dear Colleague letter published by START. Copies of these descriptions are contained in Appendix A. Institute staff made presentations at a number of national professional conferences (including DEC, CEC, TASH, AAMD, AERA, NCCIP) and regional conferences (including meetings in Utah, Montana, Alabama, South Carolina, Louisiana, Nevada, Nebraska, California, Arizona, New Mexico, and Colorado). Advisory board members and field reviewers were also sent letters requesting that they contact us about any potentially interested programs. Thus, information about the institute's desire to talk with sites interested in collaboration was widely disseminated. In addition to an active search for the best research sites possible, many programs elected to contact the institute directly to discuss their interest.

Each site contacted was provided with a description of the institute and apprised of the criteria for inclusion as one of the 16 longitudinal studies. These criteria included:

1. ability to randomly assign subjects;
2. relevant treatment differences;
3. sufficient number of children;
4. willingness to provide access to cost information;
5. ability to participate in child assessments on a longitudinal basis;
6. staff interest in the project; and
7. ability to fund any expanded services that were necessary for the comparison.

Many programs which were contacted were not able to meet these criteria. For some programs, current services were either very

comprehensive, or the funding necessary to implement an expanded services program was not available. Other programs had sufficient funding, but did not have an adequate number of children for a large longitudinal study. Yet other programs found that random assignment would be neither feasible nor desirable for their population. Table III.1 contains a listing of those major sites contacted by the institute who were unable to participate, and indicates the primary reason they were unable to participate.

Those programs which looked highly promising were visited by a staff member from the institute. Site visits provided staff with the opportunity to see the programs in action and to talk with program staff. Information which was difficult to obtain over the phone thus became available as the result of these visits. Table III.2 contains a listing of each program visited and by whom.

As a result of these site visits, programs were selected for consideration as one of the longitudinal studies. The following sections of this report contain descriptions of each of the sites being proposed for inclusion as one of the 16 longitudinal studies to be conducted by EIRI. As these descriptions indicate, the studies which have been selected represent a wide range of populations and comparisons, all of which are consistent with the requirements of the RFP. Obviously, the selection of sites was necessarily restricted by the requirements of the RFP and the inability to provide funding for the services necessary to the experimental services being proposed. For example, many more sites could have been identified to conduct age-at-start studies if funding would have been available through the contract to begin serving some of the very young children in a state who were currently not receiving services. In other cases, interested programs

Table III.1
Programs Contacted that were Unable to Participate

Program	Location	Reason for Rejection: Type or Number of Subjects	Program Already Comprehensive	No Funding for Added Services	Inability to Randomly Assign	Comparison Not Consistent With RFP	Not Possible to Conduct a Study at This Time
1. Arkansas School for the Blind	Little Rock, AR			X			
2. Arizona State University	Tempe, AZ						X
3. Dept. of Developmental & Behavioral Pediatrics	Fresno, CA					X	
4. Univ. of California--Irvine	Irvine, CA			X			X
5. California State University	Northridge, CA	X		X			
6. Georgia DD Council	Atlanta, GA	X					
7. University of Georgia	Athens, GA				X		
8. Irving Harris Project	Chicago, IL	X			X		
9. Illinois School for the Visually Impaired	Jacksonville, IL			X			
10. Project CONNECT	Barrington, IL	X					
11. Apple Project	Illinois					X	
12. Michael Reese Hospital	Chicago, IL				X		
13. Kentucky School for the Deaf	Danville, KY	X			X		
14. Louisiana School for the Deaf	Baton Rouge, LA	X			X		
15. University of Mississippi	Jackson, MS	X				X	
16. Central Institute for the Deaf	St. Louis, MO				X		
17. University of Montana	Missoula, MT	X					
18. Albuquerque Public Schools	Albuquerque, NM					X	
19. New Mexico School	Santa Fe, NM						X

Program	Location	Reason for Rejection: Type or Number of Subjects	Program Already Comprehensive	No Funding for Added Services	Inability to Randomly Assign	Comparison Not Consistent With RFP	Not Possible to Conduct a Study at This Time
20. New York City Public Schools	New York, NY						X
21. National Council for Jewish Women	New York, NY					X	
22. Family/Child Learning Center	Cuyahoga Falls, OH		X		X		
23. Franklin County MR & DD	Columbus, OH			X	X		
24. Rhode Island Division of Retardation	Providence, RI						X
25. Anna Boyd Child Development Center	Columbia, SC						X
26. Richardson Development Center	Richardson, TX	X				X	
27. Utah Department of Health	Salt Lake City, UT	X		X			
28. Primary Children's Medical Center	Salt Lake City, UT	X					
29. Utah School for the Deaf & Blind	Ogden, UT						X
30. Winston L. Prouty Ctr.	Brattleboro, VT				X		
31. State of Washington	Olympia, WA		X				
32. Wisconsin Division of Health	Madison, WI						
33. Connecticut State Dept. of Education	Hartford, CT			X			X
34. Duvalle County Schools	Jacksonville, FL			X			X

Table III.2

Site Visits to Select Research Collaborators

	Program	STAFF					
		Mott	Pezzino	Rittenhouse	Casto	Tingey	White
1.	SMA/Lake McHenry	X		X			
2.	C.I.R.C.L.E.S.	X		X			
3.	Wabash & Ohio Valley	X		X			
4.	Citizens for the Disabled	X		X			
5.	Indiana School for the Deaf	X		X			
	Alabama School for the Deaf and Blind	X					
6.	a. Hearing Impaired	X					
7.	b. Visually Impaired	X					
	Des Moines Public Schools	X					
8.	a. Parent Involvement	X					
9.	b. Mainstreaming	X					
10.	Arkansas Sunshine School		X				
11.	Arkansas School for the Deaf		X				
12.	Arkansas School for the Blind		X				
13.	U.C. Irvine		X				
14.	U.C. San Diego				X		
15.	University of South Carolina				X		
16.	Baton Rouge Down Syndrome Project					X	
17.	New York Down Syndrome Project					X	
18.	Salt Lake Parent Project	X	X				
	Louisiana State University	X	X		X	X	X
19.	a. IVH Treatment Intens.	X	X		X	X	X
20.	b. IVH Age-at-Start	X	X		X	X	X
21.	c. Visually Impaired	X	X		X	X	X
22.	d. Severely Handicapped	X	X		X	X	X
23.	New Mexico School for the Deaf		X				

were serving too few children, or were unwilling to meet the criteria for random assignment.

Criteria for Selecting Sites

During the visits to programs as well as during telephone contacts, information was gathered about a number of factors relevant to conducting a research study at the site.

Random Assignment

The most relevant criteria for discussing a possible collaborative relationship was the program's willingness to randomly assign children to treatment groups. While in many instances programs were very interested in participating, random assignment was a stumbling block for participation. In some cases, it was due to the facts that programs were mandated to serve children who were identified and that the level of service was already comprehensive. In other cases, program staff had difficulty with the concept of random assignment and so were not interested in participating for this reason. Thus random assignment was a relevant criterion for initial interest and collaboration.

Treatment Differences

Many programs which were contacted by the Institute had specific ideas for research to be conducted. However, in some cases, the differences between the treatment groups proposed were relatively minimal. Whenever possible, EIRI staff discussed the possibility of substantially increasing the differences between treatment groups. For example, in the SMA/Lake McHenry Program, the original proposal was to compare once a week services to twice a week services. However, EIRI staff felt that this difference between the groups would not be sufficient to justify conducting the research. Thus EIRI staff worked with the SMA/Lake McHenry Program to develop a research design in which treatment differences were increased,

i.e., once a week services versus three times per week services. In cases where programs could not realistically provide a greater difference between the treatment groups, the institute placed them as a lower priority for inclusion.

Appropriateness of Treatment

In a later section of this report, a checklist for evaluating the appropriateness of treatment is described. Generally, the institute reviewed each program using this checklist as a reference point to determine the treatment currently being provided as well as the added services to be provided were generally consistent with "best practices." The checklist used was based on the materials used by the Technical Assistance and Development System (TADS) for conducting needs assessments with HCEEP programs. Only programs which provided evidence that the treatment being provided was well accepted for the population being served were considered for collaboration with the Institute. A decision about appropriateness, however, did not relate to the specific theoretical orientation of the program. That is, regardless of institute staff's biases about a particular theoretical approach to treatment implementation, programs which provided support for the suitability of a particular approach were seen as acceptable.

Cost Comparisons

As a primary goal of the institute is to examine not only the effects but also the costs of any particular program being implemented, it was necessary to evaluate each project on the basis of the difference in costs for the alternative programs. In many cases, an interesting comparison may not reveal substantial difference in costs, and in some cases, the comparison did over-rule the cost criterion. However, every effort was made to select programs in which cost comparisons were maximized.

Longitudinal Implications

Due to the longitudinal nature of the studies to be conducted, the ability of programs to provide access to child data after the child leaves the program was explored. In most cases, unless the child was to continue to be served by the same service program, specific procedures were not in place to follow children after leaving the early intervention program. Thus this criteria primarily provided a way of identifying the programs in which this would be facilitated versus those in which extensive efforts would be necessary to track children after leaving the program.

Population Characteristics

The populations of the studies were selected to be consistent with the requirements of the RFP. Within a particular study, however, an attempt was made to maximize the homogeneity of the population to the greatest extent possible. It was thus necessary to review each program for the type of children, being served, including handicapping condition, severity of handicap and age as well as the number of children available. When it was not possible to have a homogeneous group for one characteristic, for example handicap type, it was seen as necessary to maximize the homogeneity of other characteristics such as the age range of the subjects or their severity of handicap.

Liaison Strength

For each of the potential studies, the strength of the personnel at the site was assessed. This involved the research background of the staff, their familiarity with service provision, their understanding and knowledge of assessment, and, most importantly, their willingness and ability to work with EIRI staff. The criteria for liaison strength was primarily influenced by this last characteristic. Also, programs in which staff did have

research backgrounds were seen as being more appropriate than those in which staff did not.

Funding Configuration

Due to the restriction of using institute funds for research purposes only, it was necessary to identify programs which could provide or obtain the funding for additional services. While in many cases obtaining additional funding through grant proposals was a possibility, there was always an element of uncertainty in this approach. Thus, sites in which service money was already available for providing added services were rated more highly than those in which grant money would have to be applied for later.

Costs/Difficulty to Implement

A number of logistical issues about actually implementing the research were concluded for each potential site. While this could not be the primary criterion for site selection, it nevertheless was an aspect of the program which was evaluated. These practical aspects included both the difficulty of implementing the research as well as the difficulty the agency might have in implementing the new or added on services. From a research perspective it was necessary to look at the amount of EIRI staff time which would be necessary for implementing this project, the cost of travel to the site, the need for training site personnel, the feasibility and ease of verifying treatment implementation, the predicted subject mortality, and also the number of service providers which would be involved in the particular study. For example, in Illinois, the C.I.R.C.L.E.S. Program demonstrated the difficulty of working with a large number of programs.

From a service perspective, the availability of site personnel was reviewed, the potential integrity of the non-treatment group, i.e., the ability of the non-treatment group to access services, and also the support

from site administrators was evaluated. Administrative support was seen as being an essential component for inclusion in the longitudinal studies.

Based on the criteria just described, 20 studies are being proposed. Sixteen of these studies are the primary studies for each of the three options with four alternatives--one alternative for the treatment intensity option, two alternatives for the age at start option, and one alternative for the program variation option. The studies will be described in detail in the following section.

Proposed Sites

RFP 85-104 outlined three categories of research studies (referred to as Options) to be conducted as a part of the longitudinal studies workscope. Based on the criteria outlined above, the remainder of this section describes the proposed research sites in each of those options. Those studies proposed meet all of the criteria outlined in RFP 85-104, as well as the additional criteria outlined in our original response to the RFP. Based on our experience during the baseline period, it was deemed advisable to also propose several alternative sites (at least one in each option) which could be added if problems were experienced with any of the 16 primary sites. Table III.3 provides a listing of the sites to be included in each of the options. More detailed information about each option is given below.

Option #1: Immediate and Long-Term Effects of Early Intervention

As noted in RFP 85-104, "The purpose of these investigations is to determine the immediate and long-term effects and costs of several intensive, well-defined intervention programs for handicapped infants and preschool-aged children and their parents....intervention/no intervention is often an artificially dichotomized independent variable; that is, over the course of many experiments in the area of human services, intervention/no

Table III.3

Possible Sites for Longitudinal Studies

SITE	SUBJECTS	TYPE OF COMPARISON
OPTION #1		
(1) LSU Medical Center	Grade III and IV IVH	Treatment vs. No Treatment
(2) LSU Eye Clinic	Visually Impaired	Treatment vs. No Treatment
(3) Alabama Deaf	Hearing Impaired	3x/mo. home vs. 5 days/wk. center + 3x/mo. home
(4) Alabama Visually Impaired	Visually Impaired	3x/mo. home vs. 5 days/wk. center + 3x/mo. home
(5) Arkansas Sunshine School	Mildly to Severely Handicapped	2x/mo. vs. 8x/mo. home
(6) SMA/Lake McHenry	Severely Handicapped	1x/wk. vs. 3x/wk.
(7) Phoenix PICU (Alternate)	Severely Handicapped	Treatment vs. No Treatment
OPTION #2		
(8) Illinois Citizens for the Disabled	Mildly to Moderately Handicapped	0-3 vs. after 3
(9) LSU Medical Center	Grades III and IV IVH	birth vs. 18 mos.
(10) Wabash & Ohio	Mildly to Severely Handicapped	0-3 vs. after 3
(11) University of South Carolina	Grades III and IV IVH	3 mos. adjusted age vs. 15 mos. of age
(12) Indiana School for the Deaf	Hearing Impaired	0-9 mos. vs. 18 mos.
(13) San Diego State University (Alternate)	LBW Periventricular Leukemalacia	3 mos. adjusted age vs. 15 mos. of age
(14) New Orleans ARC (Alternate)	Severely Handicapped	0-18 mos. vs. after 18 mos.
OPTION #3		
(15) Des Moines Parent	Mildly to Severely Handicapped	Parent Involvement
(16) SLC Parent	Moderately to Severely Handicapped	Parent Involvement
(17) NY Down Syndrome	Down Syndrome	Parent Involvement
(18) Arkansas Deaf	Hearing Impaired	Oral vs. Total
(19) Nevada Behaviorally Disordered	Behaviorally Disordered	Self-Contained vs. Integrated
(20) Miami, FL (Alternate)	Mildly to Moderately Handicapped	Behavioral vs. Cognitive-Developmental

intervention becomes a continuous variable with several different levels of services provided to the members of the control group." The studies described for this option are consistent with those statements in the RFP. For example, virtually all children participating in these studies will be receiving some type of intervention treatment, although in some instances it will be limited to medical follow-along. In other cases, comparisons are between very limited services (e.g, three hours per month vs. 1/2 day 5-day-per-week program). The procedures to be followed in conducting each of these studies (e.g., sample selection, assignment to groups, monitoring of treatment implementation, data analyses) are described in our original proposal and are further clarified in the section of this report which describes the Salt Lake feasibility study. The following seven pages contain a brief description of each of the six studies (plus one alternate) proposed for Option 1. These descriptions provide information about the subjects who will participate, the alternative intervention conditions, the data to be collected, and the rationale for including this study as one of the 16 to be conducted.

The studies selected for inclusion in Option 1 represent both an extension of previous research dealing with intensity of treatment as well as some new research avenues which will add greatly to the existing research base in this area. For example, out of 162 early intervention studies reviewed by White and Greenspan (in press), seven studies were identified which dealt with intensity or duration issues (Gordon, 1969; Heber, Garber, Harrington, Hoffman, & Falender, 1972; Howard & Plant, 1967; Karnes, Teska, Hodgins, & Badger, 1970; Levenstein, 1970; Nedler & Sebra, 1971; Scott, 1974). The general conclusion of these studies was that programs which are more intense and of longer duration have an advantage over less comprehensive programs. However, the studies reviewed dealt primarily with

disadvantaged populations and suffered from a number of methodological flaws. For example, of the seven studies reviewed by White and Greenspan, only two could be classified as "good" studies--i.e., no confounding of duration/intensity with other variables. This suggests that better-designed studies must be conducted in order for researchers to have some confidence in these findings.

The studies to be conducted in Option 1 will thus represent a constructive replication (Borg & Gall, 1983) of previous research in this area--i.e., previous research findings supporting the efficacy of more intensive programs will be investigated using more methodologically sound designs than those employed by many previous investigators. These findings will, in turn, provide an empirical test of the theoretical/conceptual framework described earlier.

In addition to replicating previous findings, the studies in Option 1 will also expand upon the research base in this area by dealing with populations which have not been included in previous work. For example, there is virtually no information in the literature regarding treatment intensity issues for visually impaired, hearing impaired, severely handicapped children, or for children who have had intraventricular hemorrhage. The studies conducted in Option 1 will thus provide an important base for researchers and practitioners in this area.

Project #1

OPTION #1: TREATMENT INTENSITY

Louisiana State University

Comparison: **IVH Infants**--Treatment versus no treatment.

Contact Person: Ann Riall, Ph.D., Louisiana State University Medical Center

Location: New Orleans, Louisiana

SUBJECTS: From a pool of 60 infants born each year with Grade III or IV intraventricular hemorrhage (IVH) at Charity Hospital in New Orleans, 30 will be selected during the first year and 30 during the second year to be randomly assigned to treatment or no treatment groups after initial stratification by age and grade of IVH. Virtually all of these infants will be from black low SES families, and 60% or more of the infants will have teenage mothers. All families participating in the study will live within 30 miles of the intervention center. Infants will be enrolled when they reach three months adjusted age.

INTERVENTIONS: EARLIER INTERVENTION GROUP: Early treatment will begin with parent training and support during the time the infant is in the NICU. A once-per-week home-based training program which is designed to foster parent involvement based on a structured developmental curriculum and focusing primarily on motor development, will be implemented when the infant is released from the NICU. When the child has completed the 10-week home-based program, at approximately 6 months of age, a 2-day-per-week, 2-1/2 hour-per-day, center-based program will be initiated in cooperation with the Urban League. Transportation will be provided to all families needing it by the Urban League. The curriculum to be used in both the home- and center-based program is based on the Louisiana Curriculum for Infants. This curriculum was developed at the UAF program in New Orleans and has been used successfully with a wide variety of handicapped children over the last five years. Treatment will be provided by a special educator and an occupational therapist with neuro-developmental training. Parental involvement and parent-child interaction objectives will be key programmatic features of both the home- and center-based programs. Funding for the expanded service has been obtained through the HCEEP Demonstration program and the SEP Severely Handicapped Initiative.

CONTROL GROUP: Children in the no-treatment control group will receive the customary medical follow-up services but will not receive a structured intervention program. A few children in the control group may find their way into an existing service program, but this is unlikely based on historical evidence. At this time, the only real alternative is the Greater New Orleans ARC Program which already has a substantial waiting list and provides basic day-care as opposed to any therapeutic services.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's health, which will constitute the core measures administered at all 16 sites. Project specific posttest instruments which were selected to reflect the areas of development most likely affected by IVH will be the Movement Assessment of Infants, the Premature Infant Behavior Scale, the Carolina Record of Individual Behavior, the Early Intervention Developmental Profile, and the Toddler Temperament Scale. Specifically, these complementary measures were chosen because children with levels three and four IVH are likely to be delayed with respect to their motor development as well as their temperament characteristics.

RESEARCH QUESTIONS: Based on the Systems Theory approach which has driven the design of the longitudinal studies, the goal of this particular study is to determine the immediate and long-term impact of early intervention with infants born with Grade III or IV IVH. The initial research will take place over the four years of the option period, but will

be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for infants born with Grade III or IV IVH and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of IVH, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or nature of medical care received?

4. Is the program effect in one domain (e.g., child's motor functioning) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Despite the relatively extensive research on intervention with premature, low-birth-weight infants (e.g., see reviews by Cornell & Gottfried, 1976; Klaus & Kennel, 1982; Masi, 1979; Ramey, Bryant, Sparling, & Wasik, 1984), much of the existing literature concerns in-hospital stimulation or parent-training programs; comprehensive intervention programs have received little attention. Moreover, virtually all previous research has excluded infants who suffered major neurological insults such as IVH (Masi, 1979). This is a major flaw in the research to data, as about 80% of infants with Grade III and IV IVH exhibit severe handicaps by the time they are 3 years old.

At the present time, IVH infants receive almost no structured intervention services in Louisiana. The close proximity of this study to LSU, the successful track record LSU has working with the hospital staff, and the
established service provision program into which these children will be integrated, increases the likelihood of a successful study. The population is one that is not addressed by existing literature. The intervention focuses on the child's development and the specific deficit anticipated to be most significant at the time of intervention. The intervention is comprehensive and extends over a long-period of time; characteristics that our conceptual framework indicates are crucially related to the effectiveness of interventions beginning this early. Finally, the cost of the intervention is substantial, but reasonable if the intervention has moderate success, and no valid economic research has been conducted with infant intervention programs (Barnett & Escobar, 1986).

OPTION #1: TREATMENT INTENSITY

Louisiana State University Eye Center

Comparison: **VISUALLY IMPAIRED CHILDREN**--Treatment versus no treatment.

Contact Person: Keith Morgan, M.D., Louisiana State University Eye Center

Location: New Orleans, Louisiana

SUBJECTS: Each year 20 new referrals of 0-2-year-old children with severe visual impairment are made to the LSU Eye Clinic. During the first year, 30 currently identified children ages 0-2 will be randomly assigned to treatment/no treatment conditions. During the second year, an additional 20 children below age 2 will be assigned. The population from which children will be drawn is about 50% black and has a high degree of variability with respect to socioeconomic status. All subjects will be tested for visual activity (to ensure they are appropriate for this study) by the LSU Eye Center which is one of the top 3 centers in the country for pediatric opthamology. Children will be stratified on age and developmental level prior to assignment.

INTERVENTIONS: TREATMENT GROUP: Treatment for 0-2-year-old children will consist of individual parent training sessions in which parents will be given a structured program based on a developmental curriculum (Louisiana Infant Curriculum) supplemented by the American Federation for the Blind Reach Out and Teach curriculum during a weekly 1-1/2 hour home visit. Parents will be assigned specific activities which will require 15-20 minutes each day. Each activity is associated with a mastery criteria and children will be required to demonstrate mastery before proceeding to another activity. Activities are designed to be integrated with daily living, and generalization of skills will be emphasized. During subsequent visits, parents will be asked to demonstrate what they have been doing and necessary remediation will be done before proceeding to new training. When children turn 3, they become eligible for public school services; project staff will assist in having them placed in appropriate special education settings.

NO-TREATMENT GROUP: Children in the no-treatment group will receive the customary medical follow-up services but will not be provided with

systematic early intervention. A very few controls may access a minimal service program offered in the community prior to age 3, but based on past history, this is not expected to occur often. Even after age 3, many visually impaired children do not begin to receive services under the current system.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Event and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as being used to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health, which will constitute the core measures administered at all 16 sites. Complementary measures will include the Peabody Mobility Scales, the Uzgiris-Hunt Scales, and the Early Intervention Developmental Profile. The Peabody Mobility Scales were chosen as a complementary measure as a primary goal of this intervention is to improve the visually impaired child's ability to move about and explore his/her environment. The Uzgiris-Hunt Scales and the Early Intervention Developmental Profile were selected in order to reflect expected gains in conceptual skills, as well as specific skills in other areas of development.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of early intervention with visually impaired infants and young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for visually impaired children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of visual impairment, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or nature of medical care received?

4. Is the program effect in one domain (e.g., child's social/emotional growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Very few prospective controlled studies have been completed on children with low incidence exceptionalities, especially at the preschool level. This controlled study comparing a well-designed treatment with a control condition will add greatly to our knowledge of the effectiveness of early intervention for visually impaired children. Conducting the study in collaboration with the LSU Eye Center is particularly advantageous since this is one of the top 3 centers for pediatric opthamology in the country, if not the world. The more intensive intervention is comprehensive, involving both parent and child. From a theoretical perspective, it tests the hypothesis that a much more intensive child focused program must be provided to move the child off the "natural" path of a family-focused intervention. From an economic perspective, the intensive program is much more expensive, but it is consistent with "best practices" and will thus provide a good investigation of cost-benefit ratios.

Project #3

OPTION #1: TREATMENT INTENSITY

Alabama Institute for the Deaf and Blind

Comparison: **VISUALLY IMPAIRED CHILDREN**--Three times per month home visits vs. 5 days per week center-based services plus 3 times per month home visits.

Contact Person: Zacki Bosarge, Director, Parent-Infant Program

Location: Talladega, Alabama

SUBJECTS: Alabama Institute for the Deaf and Blind (AIDB) currently provides services for 80 2-5-year-old visually impaired children in the three region area where the research will be conducted. Utilizing this pool of subjects, 50 children ages 2-5 will be randomly assigned to one of two treatment conditions after stratification by age and degree of visual impairment. Selection of the 50 children will be done so as to maximize the homogeneity of the group with respect to age and severity of impairment, and minimize the distance each child lives from the center-based program. Preference will be given to including more severely impaired children in the group. The population in the area to be served is mostly rural with a wide range of socioeconomic variability. About 50% of the population is black. Very few services are available except for those offered through AIDB. No child will have to travel further than 40 miles round trip to the service center.

INTERVENTION: CURRENT LEVEL OF SERVICE: Visually impaired children living in this area currently receive up to three home visits per month from staff at AIDB. During these visits, the Oregon Project Skills Inventory and the Reach Out and Teach curriculum are used to provide services to children and their families. Home visitors focus on teaching parents (usually the mother) how to interact with their visually impaired children in ways that will facilitate the development of premobility, self-help skills, socialization, language and speech development, and socialization. Skill building teaching activities are organized around naturally occurring activities and materials. During subsequent visits, parents are asked to demonstrate what they have been doing and necessary remediation is done before progressing to new material.

EXPANDED SERVICES: In addition to the thrice-monthly home visits using the Oregon curriculum, children in this group will attend a five-day-per-week center-based program which will focus on direct instruction of children in all areas of development. Children in this program will participate in more structured activities designed to continue and supplement the self-help, mobility, language, and socialization skills they are receiving via the home based program, but also focused on pre-academic skills, social interaction, and independent working ability necessary for entrance into a public school program. The Learning Accomplishment Profile (LAP) will be used as the basis for daily activities after making necessary modifications for visually impaired children. The individual objectives in the LAP are hierarchically arranged under six specific domains: gross motor, fine motor, social, self help, cognitive, and language. Based on a pilot program conducted during the last year, the modified LAP appears to be an excellent way of organizing activities for this group of children.

Substantial resources are currently available via state funding, and through the Alabama Institute for the Deaf and Blind to provide these expanded services. Additional money has been requested from NIHR to supplement the state and local resources so that the expanded services can be implemented even more comprehensively.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales, as pretest measures. These measures will be used as covariates in the analysis as well as to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health, which will constitute the core measures administered at all 16 sites. Complementary measures to be used at this site include the Peabody Mobility Scales, a Social Maturity Scale for Blind Preschool Children, the Child Improvement

(Locus of Control Scale) Questionnaire, and the Impact on Family Scale. These complementary measures were specifically chosen at this site because of their expected compatibility with outcomes related to the Oregon Project Skills Inventory and the Reach Out and Teach Curriculum. The Locus of Control Measure is included because it is hypothesized that as parents' teaching skills increase their perception of control over their child's progress will also improve. The Impact on Family Scale was selected to provide a more fine-grained analysis of family outcomes where home-based only versus a home plus center combination is implemented.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of early intervention with visually impaired infants and young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for visually impaired children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of visual impairment, family income, family stability, parents' attitude toward intervention, or presence of other handicaps?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or nature of medical care received?

4. Is the program effect in one domain (e.g., social/emotional growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial, and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Almost no data exist about the effects and costs of early intervention with visually impaired children. Fraiberg's (1968, 1970) longitudinal studies suggested that early intervention can produce substantial gains and increase later educational success. Professionals serving visually impaired children in the catchment area do not believe that the current level of services (less than 1 x week) is sufficient to result in the type of gains children are capable of making. Since the current level of services is relatively minimal, this study provides a good opportunity to assess the effects and costs of early intervention. The willingness of AIDB to devote a substantial amount of their own resources is evidence of their interest in the research, which will make a successful study more probable. The staff are extremely competent and will be able to provide the intensive service program with minimal external help. The more intensive intervention is comprehensive, involving both parent and child. From a theoretical perspective, it tests the hypothesis that a much more intensive child-focused program must be provided to move the child off the "natural" path of development without intervention, even in the context of a family-focused intervention. From an economic perspective, the intensive program is much more expensive, but it is consistent with "best practices" and will thus provide a good investigation of cost-benefit ratios.

OPTION #1: TREATMENT INTENSITY

Alabama Institute for the Deaf and Blind

Comparison: **HEARING IMPAIRED CHILDREN**--Three times per month home visits vs. 5 days per week center-based services plus three times per month home visits.

Contact Person: Zacki Bosarge, Director, Parent-Infant Program.

Location: Talladega, Alabama

SUBJECTS: There are currently 130 birth-to-five-year-old hearing impaired children being served in the three-region area in which the research will be conducted. Utilizing this pool of subjects, 70 2-to-4-year-old children with moderate to profound hearing loss will be randomly assigned to the two treatment conditions after stratification by age and degree of hearing loss. Selection of the 70 children from the available pool will be done so as to maximize the homogeneity of the group with respect to age and severity of impairment, and minimize the distance each child lives from the center-based program. Preference will be given to including more severely impaired children in the group. The population in the area to be served is mostly rural with a wide range of socioeconomic variability. About 50% of the population is black. Very few services are available except for those offered through AIDB. Children will be selected so that no child will have to travel further than 40 miles round trip to the service center.

INTERVENTIONS: CURRENT LEVEL OF SERVICE: Children living in this area currently receive up to three home visits per month from staff at the Alabama Institute for the Deaf and Blind. During the visits, the SKI*HI curriculum, a home-based model of service delivery developed at Utah State University and approved by the Joint Dissemination Review Panel for national dissemination, is utilized in providing services to the children and their families. The SKI*HI model utilizes parent advisors who visit each home to teach parents how to interact with their hearing-impaired children in ways that will facilitate the development of auditory skills, communication ability, and parent child interaction. Skill building is organized around naturally occurring activities and materials. During subsequent visits, parents are asked to demonstrate what they have been doing, and necessary remediation is done before progressing to new materials.

EXPANDED SERVICES: In addition to the thrice-monthly home visits using the SKI*HI curriculum, children assigned to the more intensive service option will attend a five-day per week center-based program which will focus on direct instruction of children in all areas of development. Substantial resources are currently available via state funding and through the AIDB for expanding the home-based program. Additional money has been requested from NIHR to supplement the state and local resources so that the expanded services can be implemented even more comprehensively.

Children in this group will participate in more structured activities designed to continue and supplement the auditory and communication skills training they are receiving via the home-based program, but also focused on preacademic skills, social interaction, and independent working ability necessary for entrance into a public school program. The Learning Accomplishment Profile (LAP) will be used as the basis for daily activities after making necessary modifications for hearing impaired children. The individual objectives in the LAP are hierarchically arranged under six specific domains: gross motor, fine motor, social, self help, cognitive, and language. Based on a pilot program conducted during the last year, the modified LAP appears to be an excellent way of organizing activities for this group of children.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as to investigate whether certain types of families or certain types of children profit more from intervention than others. The core posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, and Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health. In addition, the Maryland Test of Syntactic Ability, the Grammatical Analysis of Elicited Language, the Peabody Picture Vocabulary Test, and the Meadow-Kendall Social/Emotional Development Inventory for Deaf Students, will be administered. These complementary measures were chosen

reflect the increased language and social gains expected as a result of participation in this more comprehensive program which focuses on language and grammatical development and which provides children with the opportunity to interact with their peers on a daily basis. These measures were also selected because they have previously been used successfully with hearing-impaired populations.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of early intervention with hearing impaired infants and young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for hearing impaired children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of hearing impairment, family income, family stability, parents' attitude toward intervention, or presence of other handicaps?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or site of intervention?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial, and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

Project #4

RATIONALE FOR STUDY: Almost no data exist about the effects and costs of early intervention with hearing impaired children. Those studies which have been conducted have focused primarily on curriculum comparisons or pre-post designs (Craig, 1964, Greenstein, 1975; Horton, 1976; Prinz & Nelson, 1984; Utah School for the Deaf, 1972). Well-designed research on intensity of treatment for hearing-impaired children thus represents a significant area of research need. This need is consistent with the views of service providers, as staff of the AIDB do not believe that the current level of services for hearing-impaired children (less than 1 x week) is sufficient to result in the type of gains children are capable of making. Since the current level of services at the AIDB is relatively minimal, this study provides a good opportunity to assess the effects and costs of early intervention. The study will also yield information regarding the combination of a very widely used home-based model (SKI*HI) with a center-based program. The problem of transition from home-based to center-based programs as hearing impaired children grow older is one of national concern. Thus, the successful combination of the SKI*HI and a center-based model would be of wide interest. Of course, this combined approach would have to demonstrate sufficiently greater efficacy to justify its relatively high cost.

Project #5

OPTION #1: TREATMENT INTENSITY

Sunshine Preschool

Comparison: **Mildly to severely handicapped children**--Home-based intervention 2 times per month versus home-based intervention 8 times per month.

Contact Person: Lowell Collins, Coordinator

Location: Benton County, Arkansas

SUBJECTS: The Benton County Sunshine Preschool typically serves approximately 60 mildly to severely handicapped preschoolers ages birth through 3 years. Currently there are 40 children identified whose parents are interested in participating in the study. It is anticipated that at least 15 to 20 more subjects will be identified based on child-find screenings which will be conducted during the summer and fall. Utilizing this pool of subjects, 50 birth-to-three-year-old children with mild to severe developmental delays will be randomly assigned to the two treatment conditions after stratification by chronological age and developmental functioning level as assessed by the Battelle Developmental Inventory. Selection of the 50 children from the available pool will be done so as to maximize the homogeneity of the group with respect to age, severity, and type of handicapping condition. The population in the area to be served is primarily rural. Most of the families fall into the low SES category.

INTERVENTIONS: HIGH INTENSITY GROUP: The high intensity group will receive an average of 8 intervention visits per month from trained paraprofessionals. Motor and speech/language therapists will accompany the paraprofessionals on home visits on an as-needed basis. Intervention will primarily be conducted on an itinerant basis and will focus on working directly with the child as well as training the parents so that they can implement quality interventions. Intervention visits will last between 1 and 2 hours. Curriculum will be based on comprehensive assessments and will basically follow a modification of the Learning Accomplishment Profile. Funding for the expanded level of services is presently available for 40 children through the State of Arkansas. Additional funding from the state will be requested for serving the additional children. If necessary, a cohort group of 20-30 children will be identified in the following year.

LOW INTENSITY GROUP: The low intensity group will receive exactly the same type of service delivery as the high intensity group, but only on an average of 2 times per month. This lower frequency of home visits is the level of service which currently exists through the Sunshine Preschool.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health. Project-specific posttest instruments, will include the Child Improvement (Locus of Control) Questionnaires, the Minnesota Child Development Inventory, and the Sequenced Inventory of Communication Development. The Minnesota Child Development Inventory, which is a parent-report of child progress, and the Locus of Control Questionnaire were chosen as complementary measures because of the heavy emphasis on parental participation in this study. The Minnesota Child Development Inventory was chosen to assess parents' perceptions of their child's development, and the Locus of Control Questionnaire was chosen in order to assess parental perception of control over their child's progress based upon eight home visits per month compared with two home visits per month. The Sequenced Inventory of Communication Development was chosen as a complementary measure because of the intervention emphasis on language development.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of early intervention with mildly to severely developmentally delayed infants and young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that

time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for mildly to severely developmentally delayed children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of developmental delay, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial, and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Historically, the frequency and intensity of much early intervention has varied from child to child and from year to year based on funding, distance from the school, parental requests, clinical judgment, and other somewhat arbitrary factors. Existing research provides little guidance as to optimal frequency of home visits. Yet, this is the most important economic consideration for home-based programs as it involves time costs for both staff and parents. In addition, recent research suggests that interventions requiring significant amounts of parent time may actually increase family stress and disrupt family functioning (Turbull, Summers, & Brotherson, 1983). In the present study, the systematic variation of the frequency of home visits will provide much needed information on the relative costs and effects of two different configurations of service delivery.

OPTION #1: TREATMENT INTENSITY

Southern Metropolitan Association/Lake McHenry Project

Comparison: **SEVERELY HANDICAPPED CHILDREN**--Once per week versus three times per week services.

Contact Person: Dr. Alice Kusmierek, Coordinator, Interagency Project for Early Intervention.

Location: Flossmoor, Illinois (Chicago suburb)

SUBJECTS: There are currently 591 children between birth and age three being served in the Lake McHenry and South Metropolitan Association regional programs. The subject pool will be restricted to new referrals who meet the criteria for inclusion. The population in the area to be served is primarily urban-suburban. The majority of subjects will be Caucasian. Socioeconomic level of the population ranges from low to high. Utilizing this pool of subjects, 60 severely handicapped infants and toddlers ages 3-21 months will be randomly assigned to groups after stratification by handicapping condition and level of parental stress.

INTERVENTIONS: CURRENT LEVEL OF SERVICE: The current level of service involves a once-per-week contact with a parent-infant educator. These sessions focus on training the parent(s) to work directly with the child in all areas of development. A cognitive/developmental approach is utilized. After children are identified, they are assessed by a team of professionals using the Arena approach in which all professionals share assessment data. Areas of delay are identified and a treatment program is developed. The parent-infant educator works with the parent(s) to implement this program. The contact can occur either at the center, which is arranged to simulate the home environment, or in the child's own home. Availability of transportation determines where the services will be provided.

EXPANDED/MORE INTENSIVE SERVICES: This group will participate in three, one-hour contacts per week with a parent-infant educator. The focus of these sessions will continue to be on training the parent(s) to work directly with the child in all areas of development. Resources for expanding services are currently available through a state 0-3 pilot program grant.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health, which will constitute the core measures administered at all 16 sites. Project-specific posttest instruments to assess child progress will be the Wisconsin Behavior Rating Scale and the Carey Series of Temperament Questionnaires developed by William B. Carey and his associates (Carey & McDevitt, 1977; Fullard, McDevitt, & Carey, 1978; McDevitt & Carey, 1975). An additional parent report measure to be used at posttest will be the Impact on Family Scale. These complementary measures were chosen to reflect the expected impacts of this particular type of intervention. The Wisconsin Behavior Rating Scale will be used as it is appropriate for assessing subtle changes in the skills of severely handicapped children. The Temperament Questionnaires should reflect improved behavioral functioning as the result of the more intensive program. The Impact on Family Scale will provide a more fine-grained analysis of family functioning as a result of increased participation in the handicapped child's program.

RESEARCH QUESTIONS: Based on the Systems Theory approach which has driven the design of the longitudinal studies, the goal of this particular study is to determine the immediate and long-term impact of early intervention with severely handicapped infants and young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for severely handicapped children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of handicap, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: It is quite common for levels of treatment intensity to be provided to children based on current funding levels and the idiosyncratic biases of program directors. As discussed in the introduction to the Option 1 studies, empirical data on the relative effectiveness of minimal versus more intensive services for severely handicapped children are lacking. More intensive services are likely to lead to greater gains in both child skills and family functioning, but research data to support this assumption is lacking. With the SMA/Lake McHenry program emphasis on teaching the parent to work with their child, particular attention will be paid to the areas of family functioning which are most impacted. Since we will triple service delivery each week, the potential contribution (and cost) of a substantial, but reasonable, increase in services will be evaluated. Again, the program is comprehensive in that it involves the family system. The coordinator of this program has a professional interest in this area and thus is very supportive of this research. This project is well organized with an extremely competent and easy to work with staff so that while the program design typifies many existing programs, its implementation represents best practices.

OPTION #1: TREATMENT INTENSITY

Phoenix Children's Hospital (Alternate)

Comparison: **Trauma victims**--Treatment versus no treatment

Contact Person: Raun Melmed, Pediatric Intensive Care Unit, Phoenix Children's Hospital

Location: Phoenix, Arizona

SUBJECTS: During 1985, the Pediatric Intensive Care Unit (PICU) at Phoenix Children's Hospital "graduated" 61 survivors of near drowning episodes (average age = 22 mos.), 136 survivors of serious multi-trauma accidents (average age = 38 mos.), and 28 survivors of severe meningitis (average age 34 mos). All of these children were neuro-compromised and virtually all will continue to exhibit seriously impaired functioning as a result of the condition which placed them in the pediatric intensive care unit. However, very few currently receive special education services prior to entering public school. Seventy of these children who are most similar in terms of age and level of functioning, will be randomly assigned to one of two treatment groups as described below. The population area from which the hospital draws is varied with respect to socioeconomic status and ethnicity.

INTERVENTIONS: INTENSIVE TREATMENT GROUP: Thirty-five children in the intensive treatment group will receive home-based early intervention services which will be coordinated with the existing medical treatment. The home-based intervention program will utilize the Curriculum and Monitoring System (a JDRP-approved, behaviorally oriented early intervention curriculum). This curriculum provides intervention activities in the areas of cognitive, language, motor, self-help, and socio-emotional development. Parents are taught how to do specific activities on a daily basis with their child. During subsequent visits, parents are asked to demonstrate what they have been doing and necessary remediation is done before progressing to new material. Parents will also participate in a parent support group. Children in this group will receive home visits 8 times per month.

EXISTING SERVICES: Children released from the PICU currently receive medical follow-along and are seen on the average of one time per quarter. Attending physicians sometimes refer children who would appear to benefit

from early intervention services to existing programs within the Phoenix area. However, based on the historical records, it is estimated that less than 10% of those children with acute needs will access such services prior to five years of age.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health, which will constitute the core measures administered at all 16 sites. Project-specific posttest instruments will be The Child Improvement (Locus of Control) Questionnaire, a test of parent knowledge, Minnesota Child Development Inventory, and Neuro-Developmental Assessment. The Locus of Control Questionnaire and a parent knowledge test related to the specific curriculum were selected as complementary measures because of the specific nature of the intervention to be employed. The Curriculum and Monitoring System is a highly structured parent administered curriculum which is hypothesized to improve parent's perception of control and increase their general knowledge in the areas of child development and behavioral intervention. The Minnesota Child Development Inventory was chosen as a complementary measure in order to more specifically assess parental perceptions of their child's development. The Neuro-Developmental Assessment is a measure which is typically used with this population of children, that is, children who were neurologically compromised due to near drowning episodes, trauma episodes, or episodes of severe meningitis.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of early intervention with infants and young children who have survived serious trauma. The initial research will

take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for children who have survived serious trauma and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of the trauma suffered, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Graduates of PICUs have received very little attention from early intervention programs. Because such children have been so heavily dependent on medical technologies to keep them alive during the life threatening crisis and continue to have pronounced medical needs, it is not unusual for the families of these children to continue to rely solely on medical types of interventions until the child reaches school age. They represent a very different population who also certainly exhibit different developmental patterns from other handicapped children. Thus, they may respond quite differently to early intervention. We also consider it important that these children are heavily involved in the medical system and that the intervention will be delivered by this system. A secondary

interest is how this delivery compares to delivery by other systems. Because families relate differently to the medical system than to school and social service systems, we expect to observe somewhat different patterns of response to intervention.

Option #2: Effects of Intervention Timing

Five of the studies were, "designed to determine the immediate and long-term effects and costs of early intervention timing (child age when intervention begins)." Studies described on the next seven pages include these five studies and two optional studies. Study #14 will actually begin data collection in October of 1986 as a back-up study in case any of the others are eliminated. The format for describing each of these studies is similar to that done for Option #1.

The studies selected for inclusion in Option 2 represent both an extension of previous research dealing with age-at-start as well as some new research avenues which will add greatly to the existing research base in this area. Previous research on the issue of age-at-start for both disadvantaged and handicapped populations was reviewed by White and Greenspan (in press). Of 162 efficacy studies, ten made direct comparisons within the same study of beginning intervention at differing ages. Five studies which made direct comparisons of starting children at two different ages with all other variables held constant (Braun & Caldwell; 1973; Caldwell & Smith, 1970; Gordon, 1969; Jason, 1977; Morris & Glick, 1977), showed .04 of a standard deviation advantage for those children who begin later. Studies which examined the effect of age-at-start but were substantially confounded with other variables such as duration or setting (Beller, 1969; Gordon, 1969; Scott, 1974; Strickland, 1971) showed an average effect size of .16 favoring children who began earlier.

Taken together, the available data suggest a very slight advantage for starting intervention programs for children earlier. However, available evidence is contradictory, and the five studies that have made the most direct comparisons did not find an advantage for beginning intervention

programs earlier. Unfortunately, all of the studies were of questionable validity.

The studies in Option 2 will thus provide a clarification of previous research by examining the age-at-start issue from a more methodologically sound perspective. Within the studies being conducted in Option 2, there will also be replications of procedures with similar populations in order to provide stronger support for the conclusions reached. For example, Studies 9 and 11 will both examine the age-at-start issue with Grade III and IV IVH infants, a population for which there is currently no empirical data on this issue. The replication of results across the two studies will thus ensure that the findings are not spurious.

Project #8

OPTION #2: AGE-AT-START

Citizens for the Disabled

Comparison: **MILDLY TO SEVERELY HANDICAPPED CHILDREN**--Early intervention services begun before age 3 versus after age 3.

Contact Person: Kathleen Cullen, Program Director, Citizens for the Disabled

Location: Belleville, Illinois (St. Louis Suburb)

SUBJECTS: Citizens for the Disabled has proposed to expand services to two counties in which no early intervention services are currently being provided. Incidence figures for these counties suggest that there are a large number of unserved handicapped children living in them. County-wide screenings have thus been implemented in order to identify 50 mildly to severely handicapped infants and toddlers between birth and age 3. The population in this area is primarily rural, with a large minority (primarily black) population. Children identified will be randomly assigned to treatment groups after stratification by age and developmental level as measured by the Battelle Developmental Inventory. Based on the rate of referral between January and June of this year, it is expected that there will be no difficulty in identifying 50 unserved handicapped children ages 0-3.

INTERVENTIONS: EARLY INTERVENTION GROUP: This group will participate in home-based intervention beginning before age 3 consisting of bi-weekly home visits, a bi-monthly parent sharing group, bi-monthly parent support group, and access to physical therapy, occupational therapy and speech and language services. The Teaching Research Curriculum will be utilized for the home intervention. This curriculum emphasizes direct instruction of developmentally sequenced skills. Parent support will be individualized with a variety of types of individual and group opportunities available. Resources for expanding services are currently available through a state 0 - 3 pilot program grant.

LATER INTERVENTION GROUP: Children will be pre- and posttested, but will receive no direct services until they enter a public school program at age 3.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health, which will constitute the core measures administered at all 16 sites. Project-specific posttest instruments, which will assess developmental gains resulting from early educational programming, will be the Bayley Scales of Infant Development and the Sequenced Inventory of Communication Development. An additional parent report measure to be administered at posttest will be the Child Improvement (Locus of Control) Questionnaire. The Bayley Scales of Infant Development were chosen as one of the complementary measures in order to obtain concurrent validity information with respect to the Battelle Developmental Inventory and because this measure is currently being used by the local site. The Sequenced Inventory of Communication Development was chosen as a complementary measure because of the emphasis of the intervention employed which focuses on communication development. The Locus of Control Questionnaire was chosen as a complementary measure in order to assess parent's perceptions of control in an intervention configuration which involves home-based intervention with very young children.

RESEARCH QUESTIONS: Based on the Systems Theory approach which has driven the design of the longitudinal studies, the goal of this particular study is to determine the immediate and long-term impact of beginning early intervention at a younger age versus beginning early intervention at an older age with mildly to severely handicapped infants and young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for mildly to severely handicapped children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of the handicap, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Obviously, beginning programs earlier has strong intuitive appeal, but little is known about the efficacy of beginning intervention services early or late (White & Casto, 1985). Furthermore, although home-based services are the most common type of services delivered prior to age 3, research that can support conclusions regarding efficacy is scarce (Halpern, 1984). Moreover, there is very little research on the costs of home-based programs (Barnett & Escobar, 1986). The lack of any type of early intervention services in a two county area thus provides a good opportunity to examine the efficacy of providing services before the age of three. In the present study, children and their families will either begin an intervention program before age 3 or will not receive services until the state mandated age of 3. It is hypothesized that child and family outcomes will be maximized when services which focus on both the child and family are begun before age 3. The staff in this program have been quite flexible in modifying aspects of their study to conform with EIRI

requirements, and are committed to a collaborative relationship. Thus, the probability of conducting a successful study with broad implications for the field is very good.

OPTION #2: AGE AT START

Louisiana State University

Comparison: **IVH Infants**--Early versus later treatment.

Contact Person: Ann Riall, Ph.D., Louisiana State University Medical Center

Location: New Orleans, Louisiana

SUBJECTS: From a pool of 60 infants born each year with Grade III or IV intraventricular hemorrhage (IVH) at Charity Hospital in New Orleans, 30 will be selected during the first year and 30 during the second year to be randomly assigned to early or later treatment groups after initial stratification by age and grade of IVH. Infants will be enrolled when they reach 3 months adjusted age. Virtually all of these infants will be from black low SES families, and 60% or more of the infants will have teenage mothers. All families participating in the study will live within 30 miles of the intervention center.

INTERVENTIONS: EARLIER INTERVENTION GROUP: Early treatment will begin with parent training and support during the time the infant is in the NICU. A once-per-week home-based training program which is designed to foster parent involvement based on a structured developmental curriculum and focusing primarily on motor development, will be implemented when the infant is released from the NICU. When the child has completed the 10-week home-based program, at approximately 6 months of age, a 2-day-per-week, 2-1/2 hour-per-day, center-based program will be initiated in cooperation with the Urban League. Transportation will be provided to all families needing it by the Urban League. The curriculum to be used in both the home- and center-based program is based on the Louisiana Curriculum for Infants. This curriculum was developed at the UAF program in New Orleans and has been used successfully with a wide variety of handicapped children over the last five years. Treatment will be provided by a special educator and an occupational therapist with neuro-developmental training. Parental involvement and parent-child interaction objectives will be key programmatic features of both the home- and center-based programs. Funding for the expanded service has been obtained through the HCEEP Demonstration program and the SEP Severely Handicapped Initiative.

LATER INTERVENTION GROUP: Children in the later treatment group will receive only medical follow-along services until they are 15-18 months old at which time they will receive the same center-based services as described above. Because these services will be delivered by the same staff in the same setting using the same child/staff ratios, it is unlikely that major differences, except for age-at-start, will exist between the two groups. A few of these children may find their way into an existing service program prior to 18 months of age, but this is unlikely based on historical evidence.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health, which will constitute the core measures administered at all 16 sites. Project specific posttest instruments which were selected to reflect the areas of development most likely affected by IVH will be the Movement Assessment of Infants, the Premature Infant Behavior Scale, the Carolina Record of Individual Behavior, the Early Intervention Developmental Profile, and the Toddler Temperament Scale. These complementary measures have been selected because they represent fine grained assessments of young children's behavior who may have been affected by intraventricular hemorrhage. Specifically, these measures reflect an emphasis on motor functioning and infant temperament. These complementary measures were also chosen in order to increase comparability of data collected at other IVH sites.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of beginning comprehensive early intervention at a younger age versus beginning such intervention at an older

age with infants born with Grade III or IV IVH. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for infants born with Grade III or IV IVH and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of IVH, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Although there is a fair amount of research with premature low-birth-weight babies (see Cornell & Gottfried, 1976; Klaus & Kennell, 1982; Masi, 1979; Ramey, Bryant, Sparling, & Wasik, 1984; for reviews), most have focused on in-hospital stimulation or parent training as opposed to a comprehensive intervention, and virtually all have excluded children who have suffered major neurological insults such as IVH. However, approximately 80% of infants with Grade III and IV IVH exhibit severe handicaps by the time they are 3 years old. At the present time, these infants receive almost no structured intervention services in Louisiana. The close proximity of this study to LSU, the successful track record LSU

has working with the hospital staff, and the established service provision program into which these children will be integrated, increases the likelihood of a successful study. This study complements the other IVH studies being planned. There is no evidence regarding the effects of intervention at various ages on children with IVH. Age at start, and thus duration of intervention, has major effects on cost. An important aspect of this study is that it yields information on the costs of services delivered by the medical system, which may be expected to differ substantially from education system costs. From a systems theory perspective, it will be important to document how educational, social service, and medical systems interact with each other and how each in turn effects the family system (Ramey, MacPhee, & Yeates, 1985).

OPTION #2: AGE AT START

Wabash and Ohio Valley Project

Comparison: **MILDLY TO SEVERELY HANDICAPPED CHILDREN**--Comprehensive five-day-per-week center-based program begun before age 3 versus after age 3.

Contact Person: Dr. Larry Eno, Psychologist, Wabash and Ohio Valley Special Education District.

Location: Norris City, Illinois (Southeastern Illinois)

SUBJECTS: The population in the area is primarily rural, Caucasian, and low SES due to the currently high unemployment rate. The Wabash and Ohio Valley Special Education District currently administers programs for 3-5-year-old handicapped children, while the Division of Mental Health administers a home-based program for birth-to-three children. These two programs have developed a collaborative relationship for purposes of the present study. Children will be identified through current DMH screening procedures as well as county-wide screenings conducted by the Wabash and Ohio Program. It is expected that at least 60 mildly to severely handicapped infants and toddlers, 0-3, will be identified and randomly assigned to groups after stratification by age and level of developmental functioning (as determined by performance on the Battelle Developmental Inventory).

INTERVENTIONS: EARLY INTERVENTION GROUP: The Wabash and Ohio Valley Special Education District has recently developed a new 5-day, 2-1/2 hour per day center-based program for birth to three children. The program will use a number of published curricula (e.g., the Hawaii Early Learning Profile), and will emphasize direct instruction of developmental skills. The resources for establishing this program are provided by a state 0-3 pilot program grant. Before age 3, children in the early intervention group will be served in this center-based program. At age 3, they will enter a 5-day per week public school program.

LATER INTERVENTION GROUP: Children will receive once per week home visits made by staff of existing DMH programs. The services will be provided according to a mental health model, and thus will basically focus on educating the parents and helping them to access services such as medical

care, etc. When the child reaches age 3, they will enter a center-based public school program.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health, which will constitute the core measures administered at all 16 sites. Project specific posttest instruments, which will assess the differential effects on developmental functioning of beginning intensive center-based services early versus later, will be the Minnesota Child Development Inventory, and the Sequenced Inventory of Communication Development. The Minnesota Child Development Inventory was chosen as a complementary measure in order to obtain information regarding parent's perceptions of the child's development. The Sequenced Inventory of Communication Development was chosen as a complementary measure because the intervention to be used will stress communication and language development with these children. These complementary measures have also been selected because of their successful use with similar types of handicapped children and their parents.

RESEARCH QUESTIONS: Based on the Systems Theory approach which has driven the design of the longitudinal studies, the goal of this particular study is to determine the immediate and long-term impact of beginning comprehensive early intervention at a younger age versus beginning such intervention at an older age with mildly to severely handicapped infants and young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for severely handicapped children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of the handicap, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost-beneficial, and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: The provision of services to the birth-to-three handicapped population is of importance in light of recent federal and state mandates. Many see these services as a downward extension of the typical center-based services provided to the 3- to 5-year-old population. While many see this as a potentially inappropriate model, many service providers feel that center-based programming for this population has a number of advantages, including greater facilitation of child progress due to daily direct instruction in developmental skills as well as decreased parental stress due to the respite nature of the services. The present study will thus examine the effectiveness of providing this intensive center-based programming before age 3. The staff of this program have extensive research backgrounds and are committed to a collaborative relationship with the institute, conditions that ensure a highly successful study. The economic implications of the alternative approaches are considerable, and the current record keeping systems and the ability to follow children and families

directly into the public school program heightens the probability of successful economic evaluation. The economic evaluation is particularly important because it investigates a center-based model for infants and toddlers. Center-based programs for children are widely thought to be more expensive than home-based, but evidence is not currently available. From a systems theory perspective, the study is particularly important because it allows us to examine a larger number of systems than do several other studies (e.g., child, family, public school, state social services, and early intervention agencies). The interactions and transition points between these systems are particularly crucial.

Project #11

OPTION #2: AGE AT START

University of South Carolina IVH Project

Comparison: **GRADE III AND IV INTRAVENTRICULAR HEMORRHAGE INFANTS (IVH)**--Services begun at 3 months adjusted age versus services at 15 months.

Contact Persons: Conway Saylor, Ph.D.; Abner Levkoff, M.D.; Medical University of South Carolina.

Location: Charleston, South Carolina

SUBJECTS: There are currently 60 IVH infants cared for each year in the Neonatal Intensive Care Unit (NICU) at the Medical University of South Carolina in Charleston, South Carolina. Subjects will be the first families returning consent forms. During Year 1, 40 of these infants will be randomly assigned to either a treatment or comparison group after stratification by severity of IVH and gestational age. During Year 2, an additional 30 infants will be assigned. The population in the area to be served is largely inner city with equal percentages of blacks and whites.

INTERVENTIONS: IMMEDIATE TREATMENT GROUP: There are currently no educational services available for NICU graduates in Charleston, South Carolina. The only services these infants currently receive include medical and social services in follow-up clinics. In addition to the medical and social service follow-up at 3 months adjusted age, experimental group members will be enrolled in a newly implemented five-day-per-week intervention program. Parents will be trained to implement a one-hour daily motor intervention program. Parents and infants will make a visit to the center once each month for monitoring purposes, and a monthly home visit will be made by project staff. Parents will be monitored weekly by telephone. The individual objectives of the Curriculum and Monitoring System (CAMS) Motor Program will constitute the basic curriculum for the intervention group. This Joint Dissemination Review Panel validated curriculum consists of 96 objectives which are developmentally sequenced from birth to age five. The CAMS Motor Program is particularly well suited for use by parents.

DELAYED TREATMENT GROUP: Children will receive the currently available medical and social services in follow-up clinics until they reach 15 months of age, at which time they will enter the expanded services program.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, the Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales, as pretest measures. These measures will be used as covariates in the analysis as well as being used to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction Questionnaire, and Parent Report of Child's Health. Project-specific posttest instruments will be the Peabody Developmental Motor Scales, the Minnesota Child Development Inventory, the Bayley Scales of Infant Development, Toddler Temperament Scale, Parent/Child Interaction, Strange Situations, and Neuro-Developmental Assessment. These complementary measures have been selected to reflect the interven-tion's focus on which emphasizes motor functioning and general developmental functioning of very young children. Additionally, because of the nature of the intervention, that is, one in which there is an emphasis on parent-administered intervention, it is hypothesized that parent/child interaction and attachment will be affected.

RESEARCH QUESTIONS: Based on the Systems Theory approach which has driven the design of the longitudinal studies, the goal of this particular study is to determine the immediate and long-term impact of beginning comprehensive early intervention at a younger age versus beginning such intervention at an older age with infants born with Grade III or IV IVH. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for infants born with Grade III or IV IVH and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of IVH, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stres stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost-beneficial, and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Although there is a fair amount of research with premature low-birth-weight babies (see Cornell & Gottfriend, 1976; Klaus & Kennell, 1982; Masi, 1979; Ramey, Bryant, Sparling, & Wasik, 1984; for reviews), most have focused on in-hospital stimulation or parent training as opposed to a comprehensive intervention, and virtually all have excluded children who have suffered major neurological insults such as IVH. At issue is the age at which intervention should start for infants who have serious medical problems and who routinely spend up to three months in intensive care units. Since these infants currently receive only medical follow-up, this study provides a good opportunity to test the age-at-start hypothesis. EIRI staff have worked closely with this program in the past, and thus anticipate an excellent working relationship for this longitudinal study. It provides a rare opportunity for a high degree of replication of another study (Project #9), but with sufficient variation in the intervention to illuminate some of the parameters regarding the optimal level of intervention program for which theory provides no clear guide. From a systems theory perspective, it will be important to document how education, social service, and medical systems interact with each other and how each in turn affects the family system (Ramey, MacPhee, & Yeates, 1985).

OPTION #2: AGE AT START

Indiana School for the Deaf

Comparison: **HEARING IMPAIRED CHILDREN**--Intervention services begun before 9 months of age versus at 18 months of age.

Contact Person: Lee Murphy, Ph.D., Superintendent

Location: Indianapolis, Indiana

SUBJECTS: The Indiana School for the Deaf currently has a center-based program for children between 18 months and 5 years of age. Staff at the project feel that there is a need, however, to expand their program to include children between birth and 18 months of age. As there is not sufficient funding to serve all children who will be identified, an age-at-start study will be possible in this program. A screening program is in place to identify deaf and hard of hearing children in this age group. Incidence figures provided by the State Board of Health suggest that there are 92 deaf and hard-of-hearing children between birth and 12 months of age in the Indianapolis area alone. It is thus expected that 50 hearing-impaired children between birth and 9 months of age could be identified over a two year period. The population in this area is urban, with minority representation similar to the national average. Children who are identified would be randomly assigned to groups after stratification by age and severity of hearing loss. Subjects will be entered on a continuous basis as identified over a two-year period until 50 subjects are entered.

INTERVENTION: IMMEDIATE TREATMENT GROUP: Children and their families will participate in a once per week treatment session. The SKI*HI curriculum will be implemented during these sessions. This curriculum utilizes parent advisors who visit each home to teach parents how to interact with their hearing-impaired children in ways that will facilitate the development of auditory skills, communication ability, and parent-child interaction. Skill building is organized around naturally occurring activities and materials. During subsequent visits, parents are asked to demonstrate what they have been doing, and necessary remediation is done before progressing to new materials. At 18 months of age the children will enter the Indiana School for the Deaf 5-day-per-week center-based program.

LATER INTERVENTION GROUP: A teacher will visit once per month to answer parental questions and discuss general problems with the parents, but no formal intervention will occur. Children will begin the Indiana School for the Deaf center-based services when they reach 18 months of age.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as being used to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health, which will constitute the core measures administered at all 16 sites. Project-specific posttest instruments, which will reflect differential child progress based on age-at-start, will be the Peabody Picture Vocabulary Test, Grammatical Analysis of Elicited Language, Meadow-Kendall Social-Emotional Developmental Inventory, and the Maryland Test of Syntactic Ability. These complementary measures have been selected in order to assess the possible effects of the intervention which is highly focused on expressive and receptive language and communication development. Grammatical analyses and syntactic ability are also thought to be important components of this communication intervention. Further, these complementary measures were chosen in order to increase the comparability of data collected with other studies involving hearing-impaired children.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of beginning comprehensive early intervention at a younger age versus beginning such intervention at an older age with hearing-impaired infants and young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan

include the following:

1. What are the immediate and long-term effects of early intervention for hearing-impaired children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of hearing loss, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost-beneficial, and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Indeed, although much anecdotal evidence exists, there is very little research on the effects of early intervention with hearing-impaired children. The few studies which do exist are primarily narrow curriculum comparisons (e.g., Greenberg, 1983; Greenstein, 1975; Horton, 1976) or have very serious methodological weaknesses (e.g., Craig, 1964; Liff, 1973; Prinz & Nelson, 1984; UNISTAPS, n.d.). While many children with hearing impairments are identified at a very young age, there is very little, if any, empirical evidence to suggest that children who receive services earlier do better than those who begin services at a later age. However, research on language acquisition suggests that the period up to 18 months is crucial to language development. Thus, it is expected that children who receive services earlier will do better than those who begin services at a later age, particularly in the area of language acquisition. The willingness of the Indiana School for the Deaf to devote a substantial

amount of their own resources to expanding their program is evidence of their interest in the research, and heightens the probability of a successful project. From a systems theory perspective, the study is interesting because so much of the early intervention is organized around naturally occurring activities in the home. Thus, the intervention attempts to become a part of the family system as opposed to being an external system which is imposed on the family. From an economic perspective, the study confronts the issue of how to value parent time and effort. Since so much of the intervention is expected to be delivered by parents, it may be fairly economical from the agency's perspective, but fairly expensive from the parent's perspective. In addition, no studies of the costs of early intervention for hearing-impaired children exist to our knowledge.

OPTION #2: AGE AT START

University of California, San Diego

Comparison: **PERIVENTRICULAR LEUKEMALACIA INFANTS**--Intervention begun at 3 months adjusted age vs. at 15 months of age

Contact Person: Allen Merritt, M.D.; Suzanne Dickson, Department of Neonatal Perinatal Medicine

Location: San Diego, California

SUBJECTS: Periventricular intraventricular hemorrhage represents the most serious neurologic lesion of the neonatal period. The lesion has come into prominence recently because of improvements in neonatal intensive care which have resulted in saving the lives of many more low-birth-weight infants. It is this low birth weight group that is at highest risk for periventricular intraventricular hemorrhage and its sequelae. Of the lesions associated with periventricular, intraventricular hemorrhage, periventricular leukemalacia which results in major tissue damage and the formation of cysts has the poorest long-term prognosis. It is a sample of these infants which will comprise the population for this study. Sixty infants who have suffered periventricular leukemalacia will be randomly assigned to one of two treatment groups after stratification by severity of insult and gestational age.

INTERVENTIONS: EXPANDED SERVICES: In addition to medical and social service follow-up at 3 months adjusted age, experimental group members will be enrolled in a five-day-per-week intervention program. Parents will be trained to implement a one-hour daily motor intervention program. Parents and infants will make a visit to the center once each month for monitoring purposes, and a monthly home visit will be made by project staff. Parents will be monitored weekly by telephone. The individual objectives of the Curriculum and Monitoring System (CAMS) Motor Program will constitute the basic curriculum for the intervention group. The Joint Dissemination Review Panel validated curriculum consists of 96 objectives which are developmentally sequenced from birth to age five. The CAMS motor program is particularly well suited for use by parents.

LATE INTERVENTION GROUP: PVL infants currently receive only follow-up services until they reach the age of three. These services include medical

check-ups and a visit with a social worker. The social worker provides support to the family but provides no formal intervention. These minimal services represent essentially a "no treatment" condition. Children in this group will be enrolled in the intervention program when they reach 15 months of age.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as being used to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction Questionnaire, and Parent Report of Child's Health. Project-specific posttest instruments will be the Peabody Developmental Motor Scales [Neuro-Developmental Assessment], the Minnesota Child Development Inventory, the Bayley Scales of Infant Development, the Toddler Temperament Scale, Parent/Child Interactions, and Strange Situations. These complementary measures have been selected because they reflect the intervention's emphasis on motor functioning and general developmental functioning of very young children. Additionally, because of the nature of the intervention, that is, one which emphasizes parental-administered instruction, it is hypothesized that parent/child interaction and attachment will be affected.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of beginning comprehensive early intervention at a younger age versus beginning such intervention at an older age with infants who have suffered periventricular leukemalacia. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for infants who have suffered periventricular leukemalacia and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of neurologic insult, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost-beneficial, and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Although there is a fair amount of research with premature low-birth-weight babies (see Cornell & Gottfried, 1976; Klaus & Kennell, 1982; Masi, 1979; Ramey, Bryant, Sparling, & Wasik, 1984), most have focused on in-hospital stimulation or parent training as opposed to a comprehensive intervention, and virtually all have excluded children who have suffered major neurological insults such as periventricular leukemalacia. Because these infants are so severely compromised, a study in this area will complement the other IVH studies nicely. Little data exists to answer the question of when intervention should start for medically compromised infants. In addition, the current level of service to this group is minimal, and accurate data exists as to the degree of insult they have suffered. The San Diego program is at the cutting edge of the work being done in this area, and thus a project at this site is highly desireable. The program is strictly home-based, and a well-done study in this area will contribute substantially to the literature (Halpern, 1984).

beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for infants who have suffered periventricular leukemalacia and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of neurologic insult, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost-beneficial, and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Although there is a fair amount of research with premature low-birth-weight babies (see Cornell & Gottfried, 1976; Klaus & Kennell, 1982; Masi, 1979; Ramey, Bryant, Sparling, & Wasik, 1984), most have focused on in-hospital stimulation or parent training as opposed to a comprehensive intervention, and virtually all have excluded children who have suffered major neurological insults such as periventricular leukemalacia. Because these infants are so severely compromised, a study in this area will complement the other IVH studies nicely. Little data exists to answer the question of when intervention should start for medically compromised infants. In addition, the current level of service to this group is minimal, and accurate data exists as to the degree of insult they have suffered. The San Diego program is at the cutting edge of the work being done in this area, and thus a project at this site is highly

desireable. The program is strictly home-based, and a well-done study in this area will contribute substantially to the literature (Halpern, 1984). One of the advantages of several studies of programs for IVH children is that it gives us some indication of idiosyncratic and geographic effects on costs relative to the effects of population and intervention design.

OPTION #2: AGE AT START

Association for Retarded Citizens of Greater New Orleans

Comparison: **Severely Handicapped Infants** - Comprehensive treatment begun before 18 months of age vs. later than 18 months of age.

Contact Person: Richard Boyd, Ph.D., Louisiana State University

Location: New Orleans, Louisiana

SUBJECTS: Thirty currently identified, but unserved severely handicapped children under 18 months of age will be randomly assigned to one of two experimental conditions during the first year. An additional 20 children will be randomly assigned during the second year. The early treatment group will begin treatment after group assignment, while the later treatment group will begin treatment one year later. Funding is currently available from the state. The majority of the currently identified infants are organically impaired and 30% are multiply handicapped. Sixty percent are ethnic group members. There is a wide range of SES, but the majority are low SES and most mothers are employed.

INTERVENTIONS: EARLIER INTERVENTION: Currently, LSU operates the only comprehensive treatment program for severely handicapped infants in the New Orleans area, but is unable to serve all such children. Children not served by this program are either not served or are eligible for an ARC-operated day care/respite care program which provides day care but virtually no therapeutic services. The ARC day care program currently has high child:staff ratios (5:1), no certified teachers, very few educational materials, and no structured intervention curriculum. By combining the application pools of the two programs, children randomly assigned to the early treatment group will receive a structured program plus the ARC day care during the first year. The structured program will be based on the Louisiana Infant Curriculum and will occur for 2-1/2 hours per day, 5 days per week. Certified teachers will deliver the intervention and child:staff ratios will be at least 2:1.

LATER INTERVENTION: Children in the later intervention group will be enrolled in the ARC day care program or receive no services until one year after initial group assignment.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, the Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be used as covariates in the analysis as well as being used to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health, which will constitute the core measures administered at all 16 sites. Project-specific posttest measures will include the Brigance Diagnostic Inventory of Early Development, a measure of sustained attention, and the Wisconsin Behavior Rating Scale. The Brigance Diagnostic Inventory of Early Development was chosen as a complementary measure for two reasons. First, because it will provide additional developmental information regarding these very young children, and secondly, because it is an assessment that is currently being used by the cooperating site. A Measure of Sustained Attention was selected, as recent research in this area suggests that infant attentional behavior is a good predictor of later cognitive functioning (Kopp & Vaughn, 1982). The Wisconsin Behavior Rating Scale was selected as it provides a fine-grained analysis of parental perceptions of their severely handicapped child's development.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of beginning comprehensive early intervention at a younger age versus beginning such intervention at an older age with severely handicapped young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for severely handicapped children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of the handicap, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost-beneficial, and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: As described in the introductory section for Option 2, the research base on the effects of age-at-start on intervention outcome is equivocal at best, and virtually no controlled studies have examined the issue of whether very early intervention is superior to somewhat later intervention given similar treatment programs applied to each group. This study will provide a good test of the proposition with a severely handicapped population, by controlling for the types of programs entered. The intensity of the program, indicated by the child:staff ratio and number of days, will ensure that a strong comparison is made. Many previous studies have involved much weaker earlier interventions compared to stronger later interventions. In addition, the cost literature is particularly weak for interventions with severely handicapped children (Barnett & Escobar, 1986).

Option #3: Effects of Intervention Components

Studies in this option have been designed to "determine the immediate and long-term effects and costs of varying specific components of well-defined early intervention programs." Three of the studies investigate the effects of adding a parent/family involvement component to an existing well-defined center-based intervention program. This was done because we believe the issue of parent/family involvement to be one of the most important issues in need of resolution. By conducting three such studies, results from individual studies can be compared with each other as well as to the existing literature. The following six pages provide summaries of each of the studies to be included in this option, along with one alternate site. The format is the same as that of the previous two options.

The studies selected for inclusion in Option 3 represent two distinct research avenues: (1) the efficacy of parental involvement in early intervention programs, and (2) an examination of various curricular options.

Researchers and practitioners in the field of early intervention have recognized the importance of the reciprocal relationships between families, target children, and service agencies. This recognition has led to the now well-entrenched assumption that effective family involvement is the key to successful early intervention programs (Jordan, Hayden, Karnes, & Wood, 1977; McNulty, Smith, & Soper, 1983). For example, White, Bush, and Casto (1985-86) noted that in their analyses of 52 previous reviews of the early intervention efficacy literature, this was the most frequently cited conclusion. Similarly, Mastropieri, White, and Fecteau (1986) found that all of the leading special education introductory text books concluded that extensive family involvement was essential for a successful early intervention program.

In spite of the almost universal support for family involvement programs among policy makers and program administrators, there is an unsettling lack of empirical data to confirm or refute the effects of such programs. For example, in their analysis of over 300 empirical investigations of the efficacy of early intervention with handicapped, at risk, and disadvantaged children, White and Casto (1985) could find no empirical support for the position that parent involvement resulted in more effective programs. They cautioned, however, that because of methodological and other flaws, including a lack of direct comparisons and a lack of adequate definition regarding the types and forms of parent involvement that have been reported, the question of efficacy has yet to be adequately addressed.

As emphasized by this recent work, it is becoming clear that even though the enthusiastic and logical support for more extensive parent and family involvement in early intervention programs has led to wide-spread adoption and legal mandates (e.g., Head Start, bilingual programs, Chapter I, and 94-142, all mandate substantial parent involvement) the empirical basis for such involvement is tenuous. The three parent involvement studies to be conducted in Option 3 will thus address this gap in the research literature and provide information for future practice.

The curricular studies in Option 3 are ones which are addressing pressing issues in the field. For example, for hearing impaired preschoolers there is little evidence as to the efficacy of two major approaches to communication training: auditory/oral versus total communication. The relative costs and effects of mainstreaming behaviorally disordered preschool children have also received minimal attention in the literature.

The literature on intervenor training suggests a small advantage for certified trainers (White & Greenspan, in press). However, this conclusion is based on only three studies which made a direct comparison between the utilization of certified versus noncertified intervenors (Barbrack & Horton, 1970; Karnes, 1973; Shortinghuis & Frohman, 1974). Thus, additional research in this area is necessary in order to replicate previous findings.

Project #15

OPTION #3: PROGRAM VARIATION

Des Moines Public Schools

Comparison: **MILDLY TO SEVERELY HANDICAPPED CHILDREN**--Center-based intervention plus parent training versus center-based intervention only.

Contact Person: Pat Hollinger, Psychologist, Des Moines Public Schools

Location: Des Moines, Iowa

SUBJECTS: Des Moines Public Schools currently serve approximately 100 handicapped preschoolers ages 3 to 5 years from which 60 children will be selected to serve as subjects in this study. The 60 children will be randomly assigned to the two treatment conditions after stratification by chronological age, handicapping condition, and level of developmental functioning. Selection of the 60 children ages 3-5 years from the available pool will be done so as to maximize the homogeneity of the group, especially with respect to age and severity of handicapping condition. The majority of these children (approximatley 90%) are Caucasian. Fifty percent are from low SES backgrounds,. 35% from middle, and 15% from high.

INTERVENTIONS: CENTER-BASED ONLY: Children will attend an existing center-based 1/2 day, five-day per week intervention program in which they will receive small group and individualized teaching sessions from special education teachers and paraprofessional aides. Language and motor therapists will provide individualized motor and speech and language instruction to the children and assist teachers with the implementation of these activities. During a typical day, children will be instructed in the motor, speech and language, self help, cognitive, and social skills areas. As part of the basic services to children, parents will be involved in IEP meetings, and teachers will occasionally visit with parents to discuss the progress of their children. No one specific commercial curriculum will be used in determining intervention goals and strategies; rather, interventions will be developed from comprehensive assessments and items drawn from a number of curricula.

CENTER-BASED PLUS PARENT TRAINING: In addition to the basic center-based service described above, children in the experimental treatment group (high parent involvement group) will receive an intensive parent training

intervention. The parent training intervention will be based on the Parents Involved in Education (PIE) training package (Pezzino & Lauritzen, 1986). These PIE training modules will be taught by the preschool professional staff, and are designed to provide parents with a systematic conceptual and hands-on experience in such areas as child development, observation and recording, targeting intervention behaviors, teaching processes, decision making, and communicating with professionals. The training format will consist of small-group lecture, discussion, and demonstrations. The average small group size will be six parents. Training sessions will consist of 20, 90-minute sessions, approximately 1 per week for 20 weeks. In addition to the 90-minute sessions, parents will be required to practice the parent intervention training at home with their children. Following the conclusion of the training, home visits will be conducted to assist parents in implementing the procedures in which they have been trained. Additionally, these visits will be used to coordinate the center-based activities with the parent activities to make sure that they are compatible. Resources are currently available via local education agency funding for providing the expanded parent training sessions. However, additional money has been requested from NIHR to supplement the state resources so that expanded services can be implemented more comprehensively.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be considered as covariates in the analysis as well as being used to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Service, and Parent Report of Child's Health. These constitute the core measures administered at all 16 sites. Project-specific posttest instruments, which will reflect the effects of parent training, will be a test of parent knowledge, Child Improvement (Locus of Control) Questionnaire, Early Childhood Continuum of Assessment,

Programming, Evaluation and Resources (CAPER), and a video-taped assessment of parent/child interaction. The Test of Parent Knowledge was selected as a complementary measure because of the specific nature of the curriculum that will be used to train parents. The Child Improvement (Locus of Control) Questionnaire, and the Assessment of Parent/Child Interaction were specifically chosen because of the heavy involvement of parents in this study. The CAPER, which assesses general developmental functioning, was chosen as a complementary measure to provide more fine-grained information on child functioning and because the measure has historically been used at this site.

RESEARCH QUESTIONS: Based on the Systems Theory approach which has driven the design of the longitudinal studies, the goal of this particular study is to determine the immediate and long-term impact of a high-quality center-based program with family involvement versus the same high-quality center-based program without family involvement with severely handicapped infants and young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of the various types of early intervention for severely handicapped children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of the handicap, family income, family stability, parents' attitude toward intervention, or presence of other handicaps?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, or objectives emphasized?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONAL FOR STUDY: While parents are often involved in their handicapped child's programming prior to age 3, there is often a tendency towards excluding parents as the child grows older. The effects and costs of family involvement are particularly important to assess in a public school setting where the transition between preschool services and school-age services can be coordinated. This project will be different from the other two family involvement studies not only because of the different type of subject population, but also because parents will function as intervenors and they will be provided with an extensive support network consisting of parent groups, access to psychological services, respite care, and assistance in accessing services through other agencies. Thus, a very comprehensive approach to involving the family is taken, and maximum allowance is made for differences in family needs. Together with the emphasis on systems transition, those aspects give this study a very strong relationship to our theoretical framework. Some researchers have claimed major cost savings from the use of parents as intervenors (e.g., Timm & Rule, 1981). However, their studies have had serious methodological short comings and are of questionable validity (Barnett & Escobar, 1986). Intensive parent involvement might impose high financial, time, and emotional costs on parents but could substantially reduce the quality of their lives (Dunlap & Hollinsworth, 1977; Turbull, Summers, & Brotherson, 1983). Indeed, the literature on parent involvement as a whole leaves so many basic issues unresolved that research in this area is needed perhaps more than in any other (Halpern, 1984; Powell, 1986; Zigler & Berman, 1983). The staff at this agency are willing to take on this project in spite of the time committment it will require, as they are extremely interested in conducting research on this issue.

OPTION #3: PROGRAM VARIATION

Developmental Disabilities Incorporated

Comparison: **MODERATELY TO SEVERELY HANDICAPPED CHILDREN**--Center-based intervention plus parent training vs. center-based intervention only.

Contact Person: Leon Soderquist, Ph.D.,Director, Developmental Disabilities Incorporated (DDI)

Location: Salt Lake City, Utah

SUBJECTS: There are currently 170 birth-to-five-year-old handicapped children being served by DDI in the greater Salt Lake region in which the research will be conducted. Utilizing this pool of potential subjects, sixty 2 1/2 - to 4-year-old children with moderate to severe developmental delays will be randomly assigned to the two treatment conditions after stratification by chronological age, handicapping condition, and level of developmental functioning. Selection of the 60 children from the available pool will be done so as to maximize the homogeneity of the group with respect to age, severity, and type of handicapping condition. The population in the area to be served is a combination of urban and suburban. Most of the families fall into low to middle SES levels. A high percentage of the subjects will be caucasian.

INTERVENTIONS: CENTER-BASED ONLY: Children will attend an existing center-based one-half-day, 4-day-per-week intervention program in which they will receive small group and individualized teaching sessions from certified special education teachers and paraprofessional aides. Certified therapists will provide individual motor and speech/language instruction to the children and help the teachers implement appropriate activities in these and other developmental areas. Children will be grouped into classrooms based on level of developmental functioning with the average number of children per classroom being 10. During a typical day, children will be instructed in the following developmental areas: motor, speech/language, self-help, cognitive, and social skills. As part of these basic services to children, parents will be involved in IEP meetings and teachers will occasionally make home visits to discuss the progress of children. No one commercial curriculum will be used in intervention; rather teaching strategies are

developed from comprehensive assessments and items are drawn from many published curricula.

CENTER-BASED PLUS PARENT TRAINING: In addition to the current level of service, children in the experimental treatment group (high parent involvement group) will receive an intensive parent training intervention. The parent training intervention will be based on the Parents Involved in Education (PIE) training package (Pezzino & Lauritzen, 1986). These PIE training modules will be taught by the preschool professional staff and are designed to provide parents with a systematic conceptual and hands on experience in such areas as child development, observation and recording of behavior , targeting intervention behaviors, teaching processes, decision making, and communicating with professionals. The training format will consist of small group lecture, discussion, and demonstrations. The average small group size will be six parents. The training sessions will consist of twenty, 90-minute sessions approximately one-per-week for 20 weeks. In addition to the 90-minute sessions, parents will be required to practice the parent training interventions at home with their children. Following the conclusion of the training, home visits will be continued to assist parents in implementing the procedures in which they have been trained. Additionally, these visits will be used to coordinate the center-based activities with the work done by the parents to make sure they are mutually reinforcing. Resources are currently available via state funding for providing the expanded parent training sessions. However, additional money has been requested from NIHR to supplement the state resources so that the expanded services can be implemented even more comprehensively.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory and parents will complete the Parenting Stress Index, The Family Support Scale, The Family Resource Scale, and Family Adaption and Cohesion Evaluation Scales (FACES III) as pretest measures. Core posttest measures will include The Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, The Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction Questionnaire, and Parent Report of Child's Health. Project-specific posttest measures will include a parent knowledge survey, Child Improvement (Locus of Control) Questionnaire, parent/child

interaction assessment, and the Minnesota Child Developmental Inventory. These complementary measures were chosen because of the project's heavy involvement with parents as direct intervenors. It was hypothesized that parent's involvement with a specific curriculum would increase their knowledge with respect to child development and behavior management techniques and that their locus of control would improve as a function of their increased teaching skills. Increased parent involvement with their handicapped children was also hypothesized to improve parent/child interactions. The Minnesota Child Development Inventory was chosen in order to obtain parent's perceptions of their child's developmental progress. These measures were also chosen because they were used successfully in the previous feasibility year with this study and in order to increase comparability of data collection with other parent involvement studies.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of a high-quality center-based program with family involvement versus the same high-quality center-based program without family involvement with moderately to severely developmentally delayed young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of the various types of early intervention for moderately to severely developmentally delayed children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of the developmental delay, family income, family stability, parents' attitude toward intervention, presence of other handicaps, or age at start?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Although it is widely assumed that parental involvement contributes to effective intervention, there is little empirical data addressing this question (White & Casto, 1985). This site is particularly attractive for including in the series of studies because it has established a long and successful working relationship with EIRI staff and the administrators at DDI are very committed to the research. Furthermore, the close geographical proximity to Utah State University means that the logistical burden of coordination is reduced, and monitoring can be comprehensively completed. The intervention itself is fairly time-consuming and will allow us to investigate the trade-offs between intensive parent involvement and other activities, and the implications of those trade-offs for each member of the family system--target child, mother, father, and siblings. Systems and family theory suggest that the impacts can be quite different for each family member (Dunst, Trivette, & Cross, 1986; Turbull, Summers, & Brotherson, 1983). Because the children in this study are severely handicapped (and the families are likely to be under greater stress as a result), the implications (potentially positive and negative) of parent involvement may be quite different from those for families with less handicapped children (Project #15). This kind of variation is an important area of investigation and one that has been generally neglected, even in the broader literature on families of handicapped children (Blacher, 1984).

OPTION #3: PROGRAM VARIATION

Association for Children with Down Syndrome

Comparison: **CHILDREN WITH DOWN SYNDROME**--Center-based intervention plus parent training vs. center-based intervention only.

Contact Person: Wendy Duret, Ph.D., Psychologist, Association for Children with Down Syndrome (ACDS)

Location: Bellmore, New York (New York city suburb)

SUBJECTS: There are currently 100 birth-to-5 1/2-year-old children with Down syndrome being served by ACDS in Suffolk county where the research will be conducted. Utilizing this pool of potential subjects, 60 infants and preschoolers with Down syndrome between 18 months and 4 years of age will be randomly assigned to the two treatment conditions after stratification by chronological age and level of developmental functioning. Selection of the 60 children from the available pool will be done so as to maximize the homogeneity with respect to age and severity of handicap. The population in the area to be served is urban and reflects the general ethnic and SES make-up of the county in general, that is, predominately middle class and 90% Caucasian, 10% minority (which includes black, hispanics, and Orientals).

INTERVENTIONS: CENTER-BASED ONLY: Children currently attend a center-based program five days per week for 3-1/2 hours per day. Based on a behavioral and developmental orientation, children receive small group and individualized teaching sessions from certified special education teachers and paraprofessional aides. Speech and motor therapists provide individual motor and speech and language instruction to the children and help teachers implement appropriate activities in these areas. Children generally receive speech training five days per week, motor therapy at least two days per week, music therapy at least two days per week, and behavioral intervention on an as-needed basis. As part of these basic services, parents are involved primarily through the STEP program which is an American Guidance Services Parent Program. The STEP program teaches parents that their actions result in predictable consequences related to their child's behavior. ACDS staff report that historically the parent turn out for the STEP program has been poor. Additional parent involvement consists of

"behavioral crisis intervention," that is, staff work with individual parents to help them manage particularly difficult behaviors.

CENTER-BASED PLUS PARENT TRAINING: In addition to the current parent level of services described above, children in the experimental treatment group (high parent involvement) will receive an intensive parent training intervention that is based on a systematic behavioral training format. Parents will be taught to work cooperatively with professional staff so that they can better manage their child's behavior and become more proficient in the implementation of direct instruction. The training sessions will take place weekly and will be approximately 90 minutes long. Resources are currently available for providing the expanded parent training sessions. However, additional money has been requested from NIHR to supplement state resources so that expanded services can be implemented more comprehensively.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be considered as covariates in the analysis as well as being used to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health, which will constitute the core measures administered at all 16 sites. Project-specific posttest instruments will be a test of parent knowledge, Child Improvement (Locus of Control) Questionnaire, the Minnesota Child Development Inventory, the Preschool Language Scale, and the Developmental Test of Visual Motor Integration. These complementary measures were selected in order to reflect the possible impacts of increasing parental involvement in intervention. The Parent Knowledge Test is hypothesized to reflect an increase in parent's knowledge of child development and behavior management techniques; the Locus of Control Questionnaire,and the Minnesota Child Development Inventory were selected as

complementary measures in order to obtain information regarding potential changes in parent's perceptions regarding their child's development and their ability to affect that development. The Preschool Language Scale was chosen to further assess the potential changes in the child's language development because of the heavy emphasis of the intervention on language and communication development. The Developmental Test of Visual Motor Integration was chosen because the intervention stresses the improvement of both perceptual motor activities and fine motor activities. These complementary measures were also selected because they have been successfully used at this site with this population in past years.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of a high-quality center-based program with family involvement versus the same high-quality center-based program without family involvement with Down syndrome infants and young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of early intervention for Down syndrome children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of developmental delay, family income, family stability, parents' attitude toward intervention, or presence of other handicaps?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONAL FOR STUDY: Although programs for the birth-to-three child typically involve parents at very intense levels, when children are placed in center-based programs, this parental involvement component is often attenuated. Adding a structured parent involvement component will be different from the other two studies of parent involvement (Developmental Disabilities Incorporated and Des Moines Pubic Schools) because most of these parents are already active in the local Association for Children with Down Syndrome. Thus, they already have access to a less formal but well established support network. This study addresses whether a much more structured parent involvement program which is integrated with the day-to-day center-based programming is more effective than a center-based program with networking support component. This program is unique in its focus on Down syndrome children only. This provides an extremely well-defined target population, and thus is a valuable addition to the longitudinal studies. Down syndrome is the leading clinical cause of mental retardation and allows for the very early (and accurate) diagnosis of mental retardation. Thus, it provides an opportunity to intervene at an age when other similarly handicapped children might not be identified for early intervention. The sample families are relatively well-off financially and probably among the more resourceful parents of handicapped children. Thus, it will provide an example of intervention when parents are already in better control of the situation. Some previous studies indicate that such parents may actually respond better to parent involvement programs and generate more successful outcomes (Eisenstadt & Powell, in press; Kessen et al., 1975). Comparisons of this study to others (Project #15 & #16) may provide insights into these issues.

Project #18

OPTION #3: PROGRAM VARIATION

Arkansas School for the Deaf

Comparison: **Hearing impaired preschoolers**--Total communication versus oral/aural training.

Contact Person: Jerry Finch and Lillian Blakesly, Coordinators

Location: Little Rock, Arkansas

SUBJECTS: The Arkansas School for the Deaf currently serves over 100 hearing impaired (intellectually "normal") children ages 6 months to 4 years in the Little Rock area as well as through several satellite centers throughout the state. Utilizing this pool of potential subjects, 30 hearing impaired children ages 6 months to 4 years will be randomly assigned to two treatment conditions after stratification by age and degree of hearing loss. Approximately 40 potential subjects have already expressed interest in participating in the study. An additional 20 children will be randomly assigned to treatment conditions during the following year. Selection of children from the available pool will be done so as to maximize the homogeneity of the group with respect to age and degree of hearing loss. The population in the area to be served is a combination of urban, suburban, and rural. Most of the families fall into the low to middle SES levels. Approximately 50% of the subjects will be Caucasian and 50% will be black.

INTERVENTIONS: TOTAL COMMUNICATION GROUP: Children will attend a center-based class for 2-1/2 hours per day for 4 days per week which will be staffed by a certified teacher of the hearing impaired and at least one paraprofessional aide. The curriculum will focus on group language activities, individual conversation, individual speech, socialization, and play activities. The method of instruction will consist of Signing Exact English, coupled with appropriate and consistent amplification. The Arkansas Preschool Incentive Grant is presently the primary source of funding for these services.

ORAL/AURAL GROUP: All aspects of treatment for these children will be the same as for the total communication group. However, children in the oral/aural group will not be using a signing system. Careful attention will be paid to the appropriate and consistent maintenance of amplification systems for both groups.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be considered as covariates in the analysis as well as being used to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction Questionnaire, and Parent Report of Child's Health. Project-specific posttest instruments will be the Peabody Picture Vocabulary Test, Grammatical Analysis of Elicited Language, the Meadow-Kendall Social-Emotional Developmental Inventory, and the Maryland Test of Syntactic Ability. These complementary measures have been selected in order to assess the effects of the intervention which is highly focused on expressive and receptive language and communication development. Grammatical analyses and syntactic ability are also considered to be important components of this communication intervention. These complementary measures were also chosen in order to increase the comparability of data collected with other studies involving hearing-impaired children and their families.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of varying the primary mode of communication as a part of an early intervention with hearing-impaired infants and young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of the two alternative forms of early intervention for hearing-impaired children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as degree of hearing loss, family income, family stability, parents' attitude toward intervention, or presence of other handicaps?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. fIs the program cost beneficial and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Many educators of the deaf and hearing impaired strongly advocate the use of a total communication intervention; however, some educators have suggested that for hearing impaired children who are properly amplified an oral treatment is just as, or even more, effective and has the advantages of being less restrictive, more amenable to the mainstream setting, and places fewer demands on professionals and parents to be proficient in alternate (manual) communication techniques. Additionally, some educators for the hearing impaired point out that reliance on a manual system interferes with children's development to conceptualize in ways that more normal children typically do. This research is of national interest in an ongoing debate where strong evidence has previously been unavailable. The few studies which have examined the relative effectiveness of total communication versus an oral/aural approach have either been done with older hearing-impaired children (see Nix, 1975 for a review), have been correlational or descriptive in nature (e.g., Montgomery, 1966), or have had very serious methodological weaknesses. Cost analysis is unlikely to reveal differences between intervention programs, but if they are differentially effective, there may be major differences in later schooling costs.

OPTION #3: PROGRAM VARIATION

University of Nevada Child Development Laboratory

Comparison: **BEHAVIORALLY DISORDERED PRESCHOOLERS**--Integrated vs. self-contained treatment

Contact Person: Eva Essa, Ph.D., University of Nevada, Reno.

Location: Reno, Nevada

SUBJECTS: There are currently large numbers of behaviorally disordered preschoolers who are not receiving services in the Reno, Nevada, area. Those children currently being served are seen in segregated facilities (Children's Behavioral Services). A mainstreamed treatment facility is available at the Child Development Laboratory at the University of Nevada, Reno, but currently serves no behavior disordered children. Sixty behaviorally disordered preschoolers ages 3-5 will be randomly assigned to either a behaviorally oriented treatment program conducted in a mainstreamed setting in a child development laboratory or to a self-contained program conducted in a child behavior therapy unit. The subjects will be stratified by age and severity of behavioral disorder before being assigned. Subjects have been identified and are currently available.

INTERVENTIONS: CURRENT LEVEL OF SERVICE: A small number of children with behavior disorders are currently being served through Children's Behavioral Services in Reno, Nevada. These children are being served in segregated day treatment facilities. A behavior management program is implemented for each child based upon the presenting problem. A segregated classroom is utilized to implement the treatment program. The treatment facility employs psychiatrists, psychologists, behavioral specialists, and other specialized personnel to deliver the treatment program. Parents are involved in the treatment program and sometimes are the target of interventions.

ALTERNATIVE SERVICES: The Child Development Laboratory at the University of Nevada, Reno, currently serves large numbers of normal preschool children. An opportunity exists to mainstream behaviorally disordered preschoolers into this laboratory and compare the cost-effectiveness of treatment programs delivered in segregated and mainstreamed settings. In the mainstreamed setting, 30 behaviorally disordered preschoolers will be assessed, and individualized treatment programs which

are based on behavioral principles will be developed and implemented. These programs will be implemented by the classroom teacher.

DATA COLLECTION: Parents of each child participating in the study will complete an informed consent form and provide demographic information. Children will be administered the Battelle Developmental Inventory, and parents will complete the Parenting Stress Index, Family Support Scale, Family Resource Scale, Family Inventory of Life Events and Changes, and the Family Adaptability and Cohesion Evaluation Scales as pretest measures. These measures will be considered as covariates in the analysis as well as being used to investigate whether certain types of families or certain types of children profit more from intervention than others. Posttest measures will be collected in the spring of each year and will consist of the Battelle Developmental Inventory, Vineland Adaptive Behavior Scales--Revised, Parenting Stress Index, Family Support Scale, Family Resource Scale, Parent Satisfaction with Services, and Parent Report of Child's Health, which will constitute the core measures administered at all 16 sites. Project-specific posttest instruments will be the Burk's Behavior Rating Scales and the Kaufman Assessment Battery for Children. These complementary measures have been selected because of the project's emphasis on behavior management, improved socialization, and pre-academic skill development. These complementary measures have been previously used successfully with behavior disordered children.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impact of integrated versus self-contained classes for early intervention with behaviorally disordered young children. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of the alternative forms of early intervention for behaviorally disordered children and their families on the outcome measures being used?

2. Is the magnitude of effect associated with child/family characteristics such as severity of behavioral disorder, family income, family stability, parents' attitude toward intervention, or presence of other handicaps?

3. Is the magnitude of effect associated with intervention characteristics such as degree of participation, objectives emphasized, or primary care giver?

4. Is the program effect in one domain (e.g., child's cognitive growth) predictive of effects in other domains (e.g., family stress)?

5. Are there positive and/or negative side effects associated with the intervention (e.g., improved physical health, increased sibling resentment)?

6. What are the costs of the intervention program?

7. Is the program cost beneficial and over what time period?

8. What is the marginal contribution to effect as related to costs of various program components?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: Cities with high percentages of transient populations suffer from increased incidence of preschoolers with behavior disorders. Typically, these children are treated individually or in segregated settings. While mainstream programs are often argued for on the grouns that they provide a more normal environment and contribute to social adoption, others argue that segregated programs are more effective and less costly. Hartup (1978) argued that integration contributes to social development through peer interactions and that peer relations effect socialization synergistically with adult-child relations. Yet, he concluded that the existing literature provides only "good guesses and points of departure" for practitioners (p. 48). Nordquist (1978) raised the possibility of possible adverse effects from techniques designed to encourage interaction with nonhandicapped peers and called for comparisons of multiple settings. Much of the existing research indicates mostly nutral results from integration (Devoney, Guarlnick, & Rubin, 1974; Ray, 1974). Before any strong conclusions can be drawn, much more extensive data are required on the relative interactions of children, child development, effects of family, and later school success and general social behavior (Appoloni & Cooke, 1978). This research will compare those children seen in a mainstreamed setting with the cost-effectiveness of a program conducted in a segregated setting. The close working relationship between the staff of this project and EIRI staff will faciliate conducting high-quality research at this site.

Project #20

OPTION #3: PROGRAM VARIATION (ALTERNATE)

Miami Public Schools Curriculum Variation

Comparison: **MILDLY TO MODERATELY HANDICAPPED PRESCHOOLERS**--Behavioral curriculum versus cognitive-developmental curriculum.

Contact Person: Ronnie Table, Preschool Coordinator, Special Education

Location: Miami, Florida

SUBJECTS: Four hundred eighty mildly to moderately handicapped children ages 3 to 5 in 40 classrooms. Each classroom has 12 children served by one teacher and an aide. All classrooms are full-day (8 a.m. to 2 p.m.). All teachers are certified, and transportation is provided. Ten of the classrooms are in an inner city area of economically disadvantaged families. Children from low-income families who have less severe handicaps are referred to local Head Start programs, so that these children are both disadvantaged and substantially handicapped. Half of the teachers and aides will be randomly assigned to each of two different curricula. Thus, half of the classrooms will use each method. The unit of analysis will be the classroom. Five children from each classroom will be randomly selected for intensive data collection. The other children will be assessed by less costly means such as surveys and school records data. Children will be followed through school with the help of the Miami public school system, whose staff is extremely supportive of this research.

INTERVENTIONS: BEHAVIORAL MODEL: Programs based on the behavioral model derive from the work of Skinner and use "applied behavioral analysis" (Baer, Wolf, & Risley, 1968). Preservice and inservice training will be provided to the teaching staff who are randomly assigned to this model. A widely used and accepted version of this curriculum model will be used, such as the Direct Instruction program developed by Bereiter and Engelmann (1966). Recognized experts who are experienced trainers will be used to deliver the teacher training.

COGNITIVE DEVELOPMENTAL MODEL: Programs based on the cognitive developmental model rely on the work of Piaget and his followers (Kamii, 1972; Wadsworth, 1971). The notion of the child's actions as a key to learning is fundamental to this approach. As with the behavioral model, preservice and inservice training will be provided in a well-known, widely-

used model by experienced and recognized trainers. One such model in which training is readily available is the High/Scope curriculum (Hohmann, Banet, & Weikart, 1978). The curriculum has been implemented in programs for children with a wide range of handicaps (Ispa & Matz, 1978).

DATA COLLECTION: Classrooms will be monitored continuously, and their implementation of the curricula rated several times over the school year based on direct observation. Pre- and posttest measures using the core battery will be collected for the 200 handicapped children who are part of the longitudinal studies (using additional funds obtained from NIHR). In addition, complementary measures will include the Minnesota Child Development Inventory and the Child Improvement (Locus of Control) Questionnaire. The most important data are expected to be provided from the information that the school system routinely collects as children progress through school and from later family surveys. The data include school progress, special education placement, grades, psychological referrals, IEPs, and routine standardized tests administered by the school district to all students. As always, informed consent will be obtained for data collection. School records will provide much of the needed demographic data.

RESEARCH QUESTIONS: The goal of this particular study is to determine the immediate and long-term impacts of alternative curricula for preschool handicapped children and their parents. The initial research will take place over the four years of the option period, but will be designed so that additional follow-up will be possible well beyond that time. The basic questions which have guided the development of this plan include the following:

1. What are the immediate and long-term effects of the alternative preschool curricula on cognitive and social development of handicapped children?

2. What are the immediate and long-term effects on family stress?

3. What are the long-term effects on school progress, placement, and achievement?

4. Are the magnitudes of effects associated with child or family characteristics?

5. Are the magnitudes of effects associated with teacher characteristics such as age, experience, and training?

6. Are the magnitudes of effects associated with the degree to which the curricula are correctly implemented?

7. Are there (unanticipated) cost differences between the two curricula, for example, does one result in higher teacher turnover?

8. Are there positive and/or negative side effects associated with either curriculum?

9. Are there long-term economic differences between the results of the two curricula from educational cost savings and differences in the family's quality of life?

In addition to these basic questions, it is expected that other questions will evolve during the course of the investigation. Such questions can be addressed during subsequent years.

RATIONALE FOR STUDY: The choice of curriculum model is a basic decision for every preschool intervention program. Unfortunately, many programs fail to have a consistent curricular approach and frequently models that are the least desirable for handicapped children from a theoretical perspective are adopted (Anastasiow, 1978). In this study, two of the most promising models are compared. Some curriculum comparison studies have been done with disadvantaged children (DiLorenzo, Salter, & Brady, 1969: Karnes, 1973; Miller & Dyer, 1975; Smith, 1973; Weikart, Epstein, Schweinhart, & Bond, 1978). Several of the studies suffered from problems that weakened their validity. None found consistent, lasting differences in effects on children. Effects on families were not examined, however. Unfortunately, valid curriculum comparisons have not been conducted for preschool handicapped children. The issue of curriculum choice has become more salient recently because of the publication of results indicating that the behavioral model has extremely adverse affects on long-term social development when compared to other preschool curricula (Schweinhart, Weikart, & Larner, 1986). Although this study was conducted with disadvantaged children, it obviously raises serious concerns for parents, teachers, and others concerned with handicapped preschoolers. In addition, there is concern in the field that the behavioral model may lead to a higher degree of "burn-out" among children and parents when used in a program with extensive parent involvement and intervention. Given increasing interest in the potential adverse effects of parent involvement, research on which models minimize those effects will make an important contribution (Turnbull, Summers, & Brotherson, 1983). The study will have an exceptionally strong

design, as only the curriculum will be varied. Duration and intensity will be exactly the same for both groups. Both models are highly structured and both programs are full-day, five days per week, with a strong parent involvement component. Parents will use the approach at home that corresponds to the approach used in the child's classroom. Child and family measures will be obtained. Longitudinal data collection allows us to test for the long-term effects found in previous research. Although there are unlikely to be cost differences between the preschool programs there may well be differences in later schooling costs and in the parents' quality of life. Those are important issues in economic evaluation.

IV. DESIGN/ANALYSIS ISSUES

The basic approach to be used by the institute in analyzing data from the 16 longitudinal studies is described in pages 36 through 58 of the original proposal. None of the activities during this base period have caused us to alter this basic approach. However, there are several issues that warrant further clarification or additions. Those issues are summarized briefly in this section.

Attrition

As noted in the original proposal, attrition is one of the most serious challenges associated with conducting longitudinal research. Although the analysis techniques for attempting to deal with attrition once it has occurred are relatively straight forward and non-controversial (Jurs & Glass 1971), virtually everyone agrees that only limited corrections are possible in many cases and the best approach is to devote substantial resources to preventing attrition from occurring. Consequently, EIRI staff have identified the following strategies for preventing the occurrence of attrition:

Payment to parents: Originally we had planned only to pay parents in the experimental groups of Options 1 and 2 for participating in each annual assessment. However, because attrition is just as serious whether it occurs in the experimental group or the control group, it appears advisable to pay all parents a $25.00 incentive for completing the annual assessment battery. Money obtained from the National Institute of Child Health and Human Development for broadening the assessment activities of the institute is available and will be devoted to this purpose. Parents will not be paid until after they and their child have completed the assessment battery for that year.

Liaisons with service provider: An important strategy for avoiding attrition is to nurture a feeling of commitment to the project among those who are participating. A key link in this strategy is the service provider. Thus, if we can keep service providers committed to the project, their attitude will probably transfer to many of the participants. Nurturing a positive attitude toward the research among key staff of the service provider is essential because these are the people who have the most frequent contact with the participants in each study. Such feelings of commitment will be fostered by frequent and consistent communication with the service provider staff about the research activities, opportunities for interested service provider staff to participate in the publication of data from the research project, provision of technical assistance to the service provider in

upgrading their program, and assistance to the service provider in identifying additional funds for expanding and strengthening the services they provide. The foundation for these types of activities has already been established during the baseline period. For example, of the 16 proposed projects, EIRI has been instrumental in obtaining substantially expanded resources for services for 8, and some additional resources for seven others. Thus, service providers understand that EIRI is committed to helping them improve the quality of their intervention.

Communication with parents: Although EIRI staff will have to depend on the service provider staff for the week-to-week contact with participating families, it is nonetheless important for EIRI to communicate the following three messages as parents are recruited to the project. First, each person will benefit from participating; second, participation will benefit others in the future; and third, research staff will be responsive to concerns of parents and will keep parents and family informed about the results of the research. These messages will be communicated to parents via the informed consent form and during the pre-testing assessments. Also, EIRI is planning to distribute a newsletter twice each year to all participating families. This newsletter will provide general information about child development and nutrition and family support resources that will not interfere with the research design. By mailing the newsletters to parents we will have two more opportunities each year to identify families who have moved. Forwarding addresses, if any have been left, will be obtained from the U.S. Post Office, and for those families which have moved, immediate steps will be undertaken to locate them before the "trail becomes cold." Finally, parents will be fully informed as to their roles and responsibilities if they decide to participate. They will be given explicit examples of what their time commitments will be, and they will be informed of measures and precautions taken to ensure their family's safety and privacy. Also, we will ask parents to talk with us and site personnel if they are considering dropping out.

Other tangible incentives: In addition to the $25 which will be paid to all parents for participating in the annual assessment, we are now attempting to identify major manufacturers of toys (such as Johnson & Johnson and Discovery Toys, Inc.), and magazine publishers who might be willing to donate toys or magazine subscriptions to all parents who participate in the project. The types of toys and magazines selected will not compromise the design of the experiment, but will provide parents with tangible evidence that their continued participation in the project is important to us. Several contacts with major companies have been made and we are optimistic that one or more donors will be found to participate in this aspect of the project.

Infant formula: In those projects which involve neonates we will ask manufacturers of infant formula to donate infant formula to participating families in both experimental and control groups. One of the projects which has been carrying out some feasibility studies during this past year has already done this successfully, so we are optimistic that it will be possible. In addition to providing another incentive for participation, this will also help to eliminate any confounding of the results due to inadequate nutrition.

Locating difficult-to-find families: The activities described above will provide us with numerous opportunities each year to have contact with parents. For those parents who "become lost" during the year a number of techniques will be immediately implemented to locate them. The first will be the locator service provided through the U.S. Postal Service. For a nominal charge ($1 per family), the Post Office will provide information about any forwarding address that has been left. The second will be contact with the neighbors and relatives whose names have been provided by the parents as part of the demographic information completed at the beginning of the project. These people will oftentimes have information about where the family has moved. In addition, we are pursuing the possibility of obtaining assistance from the Social Security Administration in locating such difficult-to-find families. The Social Security Administration would only be able to help in those cases where the family has provided explicit permission, but it appears that this may be a possibility.

Using the variety of techniques described above, we are optimistic that attrition will not be a serious problem during the first four years of the contract. In those cases where attrition does occur, analysis techniques described in the original proposal will be used to make whatever adjustments are possible.

Collection of Pretest Data

Due partly to limited resources, the original proposal did not envision the collection of extensive pretest data. However, the activities of this base period have made it clear that pretest data are essential for three important reasons. First, it is clear from our experience and the reports of others, that some children and families appear to benefit more from early intervention services than do others. The critical question is why these differential benefits occur. Pretest measures on family structure and functioning, home environment, and child functioning have been added to the core assessment battery in order to examine some of the possible reasons for the differential effect of early intervention. For example, it may be that for financially secure, high functioning, relatively healthy and intact families, early intervention adds very little to a child's developmental progress. For families which are overly stressed, disorganized, or lacking adequate resources, intervention may be particularly beneficial. Pretest data on child and family functioning will be used in conjunction with the

demographic data already planned for collection to investigate several such hypotheses.

A second reason for collecting pretest data is demonstrated by the findings of the meta-analysis (see White & Casto, 1985), which showed that a great deal of the current research about the efficacy of early intervention for handicapped children is based on pretest, posttest design in which children make more growth than the investigators anticipated. A number of popular and widely disseminated arguments for using such designs to estimate the impact of intervention have been advanced (see for example, Wolery, 1983; Bagnato & Neisworth, 1980; Simeonsson & Weigerink, 1975; and Simeonsson, Huntington, & Short (1982), and Carr (1979). Based on data from the feasibility study, it appears that such estimates of intervention impact may be misleading. For example, if the study in Salt Lake City investigating the effects of parent involvement had been done using a one-group pretest/posttest design, the conclusion would have been that involving parents was a very effective strategy since moderately to severely handicapped children who were functioning at about 60% of their chronological age, made approximately one month of growth for every month of intervention. However, the presence of a control group in this study demonstrated that children in both groups (i.e. the group with parent involvement and the group without parent involvement) made approximately the same amount of pretest to posttest growth. These data raised questions about whether adding a parent involvement component to a high quality center-based program results in any additional child growth.

A third reason for collecting pretest data is based on findings from the Salt Lake City feasibility study. It appears that pretest data can be particularly useful to stratify prior to randomization to increase the probability of achieving comparable groups. As reported in the section on feasibility studies, this type of stratified randomization is successful

even with relatively small sample sizes and heterogenous group of subjects.

Finally, the original proposal described our plan to use analysis of covariance techniques to increase the statistical power of each study. However, given the type of pretest data which were planned for collection, the options for possible covariates were fairly limited. Since each of the longitudinal studies will have relatively small sample sizes (25-35 subjects per group), analysis of covariance is very important to substantially increase the statistical power of each study to a more reasonable level. The expansion of pretest measures which is now planned will provide additional opportunities for identifying powerful covariates.

Establishing Alpha Levels and Educational Significance

Statistical significance testing should be viewed as a means toward an end, not as end in itself. As Winch & Campbell (1969) pointed out, statistical significance testing provides a good means of determining whether observed differences between the groups are larger than would have been expected as a function of sampling fluctuation. However, it is clear that statements about statistical significance (i.e., the Type I error) cannot be made in the absence of considerations about statistical power (i.e., the Type II error). As pointed out by Hopkins, (1973), too many people, attempting to be rigorous, set the probability level for Type I errors at .01, ignoring the fact the probability of making a Type II error (i.e., failing to detect true differences) may be 60% or 70%. A much better strategy is to attempt to balance Type I and Type II errors.

In order to achieve such a balance, Alpha levels in each of the present studies will be set at .05 for one-tailed tests of significance. Taken in conjunction with the covariance procedures that are proposed, this will mean that each of the proposed studies will have Type II errors of 15% or lower. Setting Alpha in this way is also supported by the longitudinal nature of the study. In other words, those variables which are of the greatest

interest to early intervention are variables which are easier to measure and more powerful as time proceeds. For example, one of the most compelling arguments for early intervention is that, at least for disadvantaged children, there is evidence that intervention reduces the need for special class placement and grade retention as children become older.

Thus, an investment in early intervention may yield substantial economic benefits because of the savings which occur later in the educational process. The same argument cannot be made for variables such as IQ (unless they are associated with similar functional life skills). As Arthur Jensen (1981) once exclaimed, "I wouldn't give $5 to have 5 more points added to my IQ, whatever it may be." In other words, differences in IQ between groups may well be statistically significant if groups are large enough and if the most efficient statistical analyses are used. However, such differences only become meaningful if they contribute to functional life skills.

The data from these longitudinal studies will be similar. In other words, as time proceeds the variables which are examined will be more closely related to life function and, consequently, will provide more powerful estimates of the impacts of intervention programs on children and families.

Related to the issue of how to set Alpha levels for the testing of any single hypothesis is the issue of how to interpret the pattern of statistical significance tests across a wide range of dependent variables (and subtests within those variables) for a given study. For example, in the Salt Lake Feasibility Study reported earlier, there are almost 100 different tests of statistical significance when all subtests are included. Obviously, several statistically significant differences would be expected by chance alone. Thus, it is important to examine the pattern and logical consistency of differences and not rely on a magical number for Alpha to

establish statistical significance. Furthermore, as pointed out by Gabriel and Hopkins (1974), appealing to multivariate analysis of variance (MANOVA) techniques as a solution to the multiple dependent variable problem is too simplistic and not very convincing. The only real solution is to use statistical significance as a tool in examining the pattern of differences, while at the same time considering the logical consistency of results, the magnitude of differences, the consistency of results from year to year, and the results of other studies in the group which provide evidence about similar questions.

Replacing Subjects/Studies

As noted above, there will inevitably be attrition in conducting longitudinal research of this nature. Such attrition will occur when collaborating agencies choose to drop out of the study, or when individual families choose to discontinue their participation or when children pass away. Such attrition will raise questions about whether, and for how long, replacements should be made. A related issue is whether or not studies should be dropped if, after several years, there are no differences between the groups. Based on the advice of the advisory committee and our experiences during this past year in conducting feasibility studies, our response to such questions is as follows:

> Several alternate sites have been proposed in the section on site selection. If, during the first twelve months of the study, any sites either drop out or are eliminated, alternate sites will be included in the study. No new sites will be added after January, 1988. Although we are relatively sure that each of the 16 proposed sites will be able to successfully complete the four years of the study, the availability of back-up sites increases the probability of completing this project with 16 studies. The decision not to add sites after January 1, 1988 was made based on the fact that only two years or less of data would be available for any sites added after that point. Since the primary purpose of this research is to collect longitudinal data, adding sites after that point would expend resources, but add little usable data.
>
> Subjects in both experimental and control groups will also be added during the first two years of the longitudinal studies. In a few cases this will be necessary to complete the sample sizes described in the section on site selection. In other cases, subjects will be added to replace subjects lost through attrition. Adding subjects during the

first two years will allow at least three outcome data collection points for each subject in the study, but still provide opportunities for maintaining adequate sample sizes. Furthermore, in those studies where it is possible, over-enrollment of subjects in the control group is planned since it appears more likely that attrition will occur in the control groups than in the experimental groups.

It is our position that data collection will not be stopped for any study because of the lack of observed differences between the groups. In other words, if a particular study continues to show no observable differences on any of the measures after the annual data collection in the second year of the longitudinal studies, we would still proceed to collect data through year four. This decision is based on our perception that one of the most pronounced shortages in the early intervention research literature is the lack of longitudinal data for handicapped children. The fact that a number of people have suggested that "sleeper" effects may exist makes it imperative to continue to collect the longitudinal data even if the immediate differences are not observed. Also, some pople have argued that early intervention programs will not demonstrate enduring effects until children are old enough to demonstrate competencies in more global areas (e.g., grade retention) for which standardized measures, such as those used in the early years of this study, are relatively poor substitutes. A final argument for continuing to collect data is that additional data collection is a relatively economical proposition by year #4 when we consider how much has already been invested.

Posttest Data Collection in Future Years

The specific measures described in the instrumentation section for core and complementary instruments apply only to the 1986-87 year. Although it is intended that the core would remain relatively stable throughout the four years of the longitudinal studies now funded, it is anticipated that substantial changes would occur in the complementary measures. For example, as children in various studies reach school age, issues of special class placement and grade retention become extremely important. Furthermore, variables about child health, and family functioning (i.e., divorce rates, employment, continuing education) become increasingly important as children become older. Therefore, both the core and the complementary measures will be revised each year based on advice from the Advisory Committee, predictions from our conceptual framework, and experience gained during the previous year.

Random Assignment to Groups

The past year has emphasized the need for EIRI staff to be responsible for assignment of subjects to groups. Excepting those few cases where assignment to groups is based on factors which are totally verifiable (in the three IVH studies, assignment will be made according to birthdate stratified by level of IVH and gestational age), the added logistical burden of having EIRI staff do the random assignment seems totally justified. This approach will be taken for two reasons. First, it removes the political problems which individual sites may experience if they are responsible for the random assignment and eliminates any temptation to "fudge" the assignment of a particular child. Second, it guarantees that assignment procedures will be done according to standard techniques and that there will be no logistical mistakes.

Summary

The preceding information refines and clarifies the analysis and design issues described in the original proposal. None of it is a radical departure from what was originally proposed. However, all of these considerations will increase the probability that conclusions drawn from the 16 proposed studies will be valuable to the field.

V. INSTRUMENTATION

Probably the most difficult issues to satisfactorily resolve in conducting longitudinal research on the effects and costs of early intervention with handicapped children are the questions surrounding instrumentation: What data to collect, when to collect those data, and how to ensure that the data are collected satisfactorily. Although, the way in which the studies are designed and the selection of the specific studies to be conducted are also important, these issues have well-developed and widely-agreed-upon strategies, techniques, and conceptual frameworks which can guide decisions. In the area of instrumentation for early childhood special education, however, the one thing which is abundantly clear is that the state-of-the-art in terms of assessing child change attributable to intervention is inadequately developed, and totally satisfactory instruments are not available. With regard to measuring the impact of early intervention on families, the field is even less well developed. Furthermore, one of the strongest suggestions from the advisory committee was that EIRI should not try to engage in instrument development while at the same time conducting longitudinal research.

Because of these issues, questions about instrumentation required a great deal of staff time and resources during the baseline period. The results and conclusions from those activities are reported in the remainder of this section. Although the resolution is not totally satisfactory for the beginning of the longitudinal studies, assessment procedures for older children are more refined which means that our confidence in measures of child functioning will increase as the child becomes older. Thus, if the studies are properly designed, and with the concomitant commitment of the Federal Government to long-term data collection, the instrumentation weaknesses for very young children becomes a less significant problem as the longitudinal studies proceed.

This section reviews the activities which were conducted in order to identify potential instruments for the various aspects of the research, the data which were collected to make decisions from among the many possible instruments, a summary of the proposed measures for both the core and complementary measures as described in the original proposal, and the proposed procedures for recruiting, training, and monitoring the work of diagnosticians.

Identification of Potential Instruments

The selection of assessment instruments for both the core and complementary outcome measures and the refinement of procedures for recruiting, training, and monitoring diagnosticians was a major task for the institute during the baseline period. As the selection of outcome measures is extremely important to the appropriate operation of the contract, considerable effort was expended in this area.

A number of activities associated with selecting assessment instruments occurred. They included:

1. Staff spent a considerable amount of time reviewing the literature on various assessment instruments that might be appropriate for a longitudinal study of handicapped preschoolers. In particular, each instrument's psychometric characteristics and applicability to the populations under study were examined. Particular emphasis was given to measures of family functioning, since this is a relatively new area of interest in the field. Consequently, measures in this area are less well defined, and appropriate measures were more difficult to identify.

The literature on measures of family functioning suggested a number of family variables that were important to assess. These included the stress experienced by the family of the handicapped child, the support and resources available to the family, the way in which a family is organized and functions, and the parents' knowledge, skills, attitudes, and

expectations. Many previous research studies have ignored the influences of the family on child outcomes, as well as the influence of an early intervention program on family functioning. The instruments which were reviewed and eventually selected for inclusion are ones which attempt to address these particular needs.

2. An assessment conference was held in Washington, D.C. on December 5, 1985, in conjunction with the biennial meeting of the National Center for Clinical Infant Programs. The purpose of this conference was to bring together experts in the field of early childhood special education who have had extensive experience measuring child and family functioning. Participants were asked to recommend instruments which would constitute a core assessment battery to be used in all 16 of the longitudinal studies.

The presentations at this conference suggested that there is no ideal child or family instrument. Even though currently available instruments have a number of shortcomings (e.g., many popular instruments, such as the Stanford-Binet and Bayley Scales of Intelligence did not include handicapped children in the normative sample, do not allow for tracking child progress across a broad age range, and exhibit problems with establishing basal and ceiling levels for handicapped children), there was still a surprising amount of consensus about what instruments represented the best possible choices at the current time given the limited pool of instruments. The child instruments suggested by these experts included the Battelle Developmental Inventory (Newborg, Stock, Wnek, Guidubaldi, & Svinicki, 1984) which had been suggested as a core measure in the institute proposal), the Griffiths Developmental Scales, (Griffiths, 1970) the Vineland Adaptive Behavior Scales - Revised, (Sparrow, Ballar, & Chichetti, 1984) and direct measures of attention. The instruments recommended for assessing family functioning included the Parenting Stress Index (Abidin, 1983), the Impact on Family Scale (Stein & Jessop, 1985), the Family Adaptability and Cohesion

Evaluation Scales (Olson, et al., 1985), the Questionnaire on Resources and Stress (Holroyd, 1974) (which had been suggested in the original proposal), and the Nursing Child Assessment Teaching Scales (Barnard, 1978). A copy of a paper summarizing this assessment conference is included in Appendix B.

3. Recommendations about assessment instruments for visually impaired children were solicited from experts in visual impairment who attended a conference on infant and preschool education of blind and visually impaired children sponsored by the American Foundation for the Blind on May 14, 1986. (Experts in this group included Dr. Kay Ferrell, National Consultant in Early Childhood for the American Federation of the Blind; Dr. Amanda Hall, Research Specialist at U.C. Berkley School of Optometry; Dr. Rose-Marie Swallow, Professor of Special Education at CSU Los Angeles; and Dr. Verna Hart, Professor of Special Education at the University of Pittsburgh.) While the lack of truly appropriate instruments was noted, the Battelle Developmental Inventory was viewed as a good assessment tool for this population. Other measures recommended for consideration included the HELP, the Adaptive Performance Instrument, The Vineland, Uzgiris-Hunt, videotaped interaction measures, temperament, and some assessment of the home environment. The need for diagnosticians to have had experience testing visually impaired children was emphasized. In general, the results of this conference confirmed that EIRI staff had been relatively on-target in selecting measures to assess the effects of intervention for visually impaired children.

4. Recommendations about assessment measures for hearing impaired children was further explored via a conference call with three experts in the area of hearing impairment. (Experts included Drs. Kay Meadows-Orlans, Pat Spencer-Day, and Rob McTurk, all from Gallaudet College.) In general, this conference call also confirmed that the instruments tentatively proposed by EIRI for the core and complementary measures were among the best

available. Strong support was voiced for the Battelle and the Grammatical Analysis of Elicited Language (GAEL), while concerns were raised about the appropriateness of the Peabody Picture Vocabulary Test (PPVT), for very young manually-oriented children. It was also suggested that EIRI consider the Measure of Mastery Motivation and the Gardner One Word Expressive Vocabulary Test as possible complementary measures.

Collection of Data on Which to Base Selection of Instruments

Based upon the literature reviews and expert recommendations, a number of investigations were undertaken to examine the feasibility of including the various instruments identified. First, copies of as many of the instruments as possible were obtained, along with whatever technical and administration information was available about each instrument. For some instruments this step led to their removal from consideration. For example, the Griffiths Scales are no longer commercially available in the United States, and thus it was decided that this would be an inappropriate instrument for use in the longitudinal studies due to its inaccessibility. In other areas, the experimental status of some of the instruments suggested that it would be risky to include them at this time. For example, while Bricker's new measure of early childhood special education appears promising, it is still under development and lacks sufficient technical information to be confident about its use.

Studies of Child Change Measures

As the result of this initial review of recommended instruments, a number of studies were undertaken to further validate those which appeared most promising. Due to the initial selection of the Battelle Developmental Inventory as a core instrument and the support for the Battelle from experts in the field, additional information was gathered to determine its appropriateness as a core measure for the institute. Since it is a new instrument, very little data are currently available other than the very

promising information contained in the technical manual. A number of studies which examined the concurrent validity of the Battelle were thus conducted. These studies included:

1. An examination of the concurrent validity of the Battelle with language disordered children. Children participating in a project at Brigham Young University were tested using a battery of language measures including the Peabody Picture Vocabulary Test, the Arizona Articulation Proficiency Scale, and the Preschool Language Scale. The Battelle Developmental Inventory was administered within one month of the administration of the language measures. As Table V.1 indicates, correlation analyses provided support for both the expressive language and total communication scores on the Battelle. Some questions about the receptive language domain of the Battelle remained, however.

2. Concurrent validity of the Battelle was examined further with a group of moderately to severely handicapped young children participating in the Salt Lake feasibility study. The Battelle Developmental Inventory was administered in conjunction with the Minnesota Child Development Inventory (MCDI), the Sequenced Inventory of Communication Development (SICD), and either the Bayley Scales or the Stanford-Binet. Correlational analyses indicated that the language scores on the Battelle correlated significantly with both the expressive and receptive sections of the SICD. There were moderately high correlations between the Battelle cognitive and total scores and the Bayley and Stanford-Binet. Also, the correlations between the subscales of the Battelle and subscales of the MCDI revealed the expected pattern of correlations. Tables V.2 and V.3 contain the correlation coefficients for this study.

3. A third study was conducted by Dr. Dick Boyd at LSU. The Battelle Developmental Inventory was administered to a group of moderately to

Table V.1

BDI and Language Measure Correlations

Battelle Developmental Inventory	PPVT-R	PLS	AAPS
Personal-Social DQ	.46	.48	-.12
Adaptive DQ	.41	.28	-.11
Total Motor DQ	.38	.31	.12
Gross Motor DQ	.37	.38	.24
Fine Motor DQ	.03	-.08	-.17
Total Communication DQ	.60*	.81**	.46
Receptive Communication DQ	.38*	.54	-.01
Expressive Communication DQ	.60*	.75**	.68*
Cognitive DQ	.52	.79**	.29
Total Score DQ	.66*	.66*	.07

PPVT-R = Peabody Picture Vocabulary Test-Revised
PLS = Preschool Language Scale
AAPS = Arizona Articulation Proficiency Scale
* = $p < .01$
** = $p < .001$

Table V.2

BDI and MCDI Correlations

Battelle Developmental Quotient Scores	MCDI Age-Adjusted[1] Scores							
	General Development	Gross Motor	Fine Motor	Expressive Language	Comprehension Conceptual	Situation Comprehension	Self-Help	Personal/ Social
Total	.55**	.38**	.49**	.39*	.38*	.22	.37	.52**
Personal Social	.52**	.25	.54**	.46**	.46**	.27	.33	.54**
Adaptive	.58**	.59**	.63**	.26	.26	.20	.57**	.45*
Total Motor	.50**	.64**	.35	.12	.12	.12	.42*	.39*
Gross Motor	.46**	.71**	.32	.03	.04	.08	.40*	.30
Fine Motor	.49**	.37*	.33	.31	.33	.17	.38*	.43*
Total Communication	.44*	.04	.30	.58**	.55**	.16	.16	.39*
Receptive Communication	.31	.01	.23	.35	.43*	.16	.11	.34
Expressive Communication	.47**	.07	.28	.69**	.57**	.10	.17	.37*
Cognitive	.36	.16	.25	.31	.36*	.12	.16	.33

* = significant at the .01 level
** = significant at the .001 level

[1]Age Adjusted = age equivalent scores divided by chronological age multipled by 100.

Table V.3

Correlations of the BDI with the SB, Bayley, and SICD

Battelle Development Quotient Scores	Stanford-Binet IQ	Bayley (Age Adjusted[1])	SICD Receptive (Age Adjusted[1])	SICD Expressive (Age Adjusted[1])
Total Battelle	.71**	.62*	.63**	.47**
Personal Social	.66**	.44	.59**	.43*
Adaptive	.56*	.66**	.55**	.43*
Total Motor	.41	.61*	.42*	.38*
Gross Motor	.25	.50	.31	.32
Fine Motor	.67**	.55*	.53**	.41*
Total Communication	.75**	.53*	.59**	.56**
Receptive Communication	.68**	.39	.50**	.33
Expressive Communication	.69**	.53*	.56**	.66**
Cognitive	.64**	.59*	.52**	.35

* = significant at the .01 level
** = significant at the .001 level

[1]Age Adjusted = age equivalent scores divided by chronological age multiplied by 100.

severely handicapped children in addition to other measures including the Bayley and Stanford-Binet. Data have been collected for 27 of the 30 children, and preliminary analyses are very positive regarding the Battelle. More information on the project is reported in the subcontractor report contained in the Management section.

Studies of Measures of Family Functioning

In the area of family assessment, the newness of many of the measures again necessitated a closer look at the feasibility and utility of using these scales with parents of handicapped children. A study was thus conducted in which a battery of family assessment measures was administered to parents of the children participating in the Salt Lake City feasibility study. This battery was designed to assess family functioning in the following areas.

1. Family Integrity: The cohesiveness, as well as adaptability, and other characteristics of the family unit, as well as life events and changes experienced by the family. This area should be important for predicting the types of families that might benefit most from intervention as well as to explain the reasons why some interventions may not be effective for some families.

2. Social Support and Resources: Levels of inter-family, intra-family, and kinship support, as well as basic resources available to the family. Recent research has shown that levels of support and resources are associated with familial well-being and stress.

3. Familial Well-Being and Stress: The family's emotional health, in particular their response to and experience of stress related to a handicapped family member.

4. Parental Knowledge, Skills, Attitudes, and Expectations: Parental knowledge of child development, teaching skills, and attitudes and expectations regarding their handicapped child.

It was the purpose of this study to both evaluate the relationship between various family measures of interest, as well as to examine the impact of the parent training program on family functioning. The measures which were administered included:

1. Family Adaptability and Cohesion Evaluation Scales (FACES III) (Olson, McCubbin, Barnes, Larsen, Muxen, & Wilson, 1985)

2. Family Environment Scale (Moos, Insel, & Humphrey, 1974)

3. Family Inventory of Life Events and Changes (Olson, et.al, 1985)
4. Family Resource Scale (Dunst, & Leet, 1985)
5. Family Support Scale (Dunst, Jenkins, & Trivette, 1984)
6. Home Observation for Measurement of the Environment (HOME) (full scale and screening questionnaire)
7. Impact on Family Scale (Stein & Jessop, 1985)
8. Child Improvement Locus of Control Scales (DeVellis, Revicki, & Bristol, 1984)
9. Parent Knowledge Survey (Pezzino, 1986a)
10. Parent Satisfaction Questionnaire (Pezzino, 1986b)
11. Parenting Stress Index (Abidin, 1983)

A number of hypotheses regarding the relationship between various measures were generated based on previous research in the area. Basically, much of this research was conducted from a theoretical framework based on social systems theory (Bronfenbrenner, 1977) and family systems theory (McCubbin, Joy, Cauble, Comeau, Patterson, & Needle, 1980; Olson, Sprenkle & Russell, 1979; Olson, Russell & Sprenkle, 1980). It was hypothesized that stress in the family system as the result of having a handicapped child is mediated by a number of variables which are not directly related the to handicapped child. In order to test this hypothesis, the social support system and resources available to the family are particularly important to assess, as is family integrity. Parental skills, knowledge, and attitudes in turn, will also influence the family's ability to foster the development of their handicapped child. The following hypotheses were tested:

Criterion-Related Validity

1. Familial stress and coping, as measured by the Parenting Stress Index, should be correlated with support and resources, as measured by the Family Support Scale and Family Resource Scale.
2. Familial stress and coping should also be related to family integrity, measured by the Family Environment Scale, FACES III, and FILE.
3. Family income and Mother's education should be correlated with both the Home Screening Questionnaire and Family Resources.

4. Locus of control should be associated with family integrity as measured by the FES.

Concurrent Validity

5. If the impact on Family Scale and Parenting Stress Index are measuring similar constructs, they should be correlated with each other.

6. If the Family Environment Scale and FACES III are measuring similar constructs, they should be correlated with each other.

Outcomes

1. The parent training program should significantly increase parent knowledge and parent satisfaction with services, while decreasing perceptions of stress.

Correlations relevant to hypotheses 1-6 are contained in Tables V.4 to V.9. These correlations indicate partial support for hypotheses 1, 2, 3, and 6. Stronger support for hypothesis 5 is indicated, while there was no support for hypothesis 4. The outcome analyses are discussed in the section on the Salt Lake City feasibility studies.

Table V.4

Correlations between Familial Stress and Support and Resources

	Family Support Scale		Family Resource Scale
	Satisfaction with Support	Number of Sources of Support	Total Score
PSI Total Stress Score	-.09	-.30	-.65**
PSI Child Domain Score	.08	-.13	-.55**
PSI Parent Domain Score	-.24	-.41*	-.65**

* $p < .01$
** $p < .001$

Table V.5
Correlations between Familial Stress and Family Integrity

Family Environment Scale	Stress		
	PSI Total Score	PSI Child Domain	PSI Parent Domain
Cohesiveness	-.45**	-.31	-.52**
Expressiveness	-.35*	-.31	-.34*
Conflict	.44**	.36*	.44**
Independence	-.38*	-.27	-.42**
Achievement - Orientation	-.27	-.15	-.35*
Intellectual - Cultural Orientation	-.44**	-.29	-.51**
Active - Recreational Orientation	-.34*	-.27	-.35*
Moral - Religious Emphasis	-.28	-.12	-.39*
Organization	-.07	-.05	-.08
Control	-.19	-.09	-.26
FILE			
Total Score for Post 12 months	.58**	.44**	.61**
FACES III			
Discrepancy Score	.31	.23	.34*

* $p < .01$
** $p < .001$

Table V.6
Correlations between Demographic Variables and the Home Screening Questionnaire

	Home Screening Questionnaire		
	Questions Subtotal	Toys Subtotal	Total Score
Mother's Education	.02	.29	.01
Family Income	.27	.44**	.33

$p < .01$
$p < .001$

Table V.7

Correlations between Locus of Control and Family Integrity

	Locus of Control				
Family Environment Scale	Professional	Divine Intervention	Parent	Child	Chance
Cohesion	-.05	-.06	.24	-.08	-.26
Expressiveness	.03	-.22	.16	.00	-.37*
Conflict	-.07	.40*	-.08	.32	.28
Independence	.02	.06	.17	.09	-.20
Achievement Orientation	.02	.08	.28	.21	.17
Intellectual - Cultural Orientation	-.20	-.26	-.03	-.32	-.22
Active - Recreational Orientation	.02	-.34*	-.14	-.39*	-.31
Moral - Religious Emphasis	-.07	-.04	-.01	-.18	-.13
Organization	-.10	-.15	.04	-.23	-.22
Control	-.34*	-.16	-.27	.13	-.08

Table V.8

Correlations between the Impact on Family Scale and the Parenting Stress Index

	Impact on Family Scale					
Parenting Stress Index	Total Score (N=49)	Sibling Score (N=37)	Stress (N=49)	Familial/Social (N=49)	Coping (N=49)	Financial (N=49)
Total Score	.75**	.56**	.72**	.57**	.51**	.55**
CHILD DOMAIN						
Total Score	.67**	.62**	.62**	.57**	.38*	.51**
Adaptability	.50**	.45*	.47**	.40*	.21	.36*
Acceptability	.55**	.53**	.45**	.47**	.29	.50**
Demandingness	.76**	.59**	.73**	.58**	.44*	.51**
Mood	.37*	.61**	.32	.37*	.15*	.37*
Distractibility	.52**	.49**	.49**	.50**	.35*	.37*
Reinforces Parent	.32	.37	.28	.22	.33*	.28
PARENT DOMAIN						
Total Score	.72**	.42*	.70**	.49**	.55**	.50**
Depression	.53**	.39*	.44**	.42*	.51**	.49**
Attachment	.28	.31	.33*	.16	-.06	.26
Restriction of Role	.70**	.53**	.74**	.46**	.40*	.51**
Sense of Competence	.62**	.32	.54**	.48**	.44**	.31
Social Isolation	.40*	.02	.40	.24	.55**	.20
Relationship with Spouse	.67**	.41*	.63**	.47**	.56**	.56**
Parent Health	.52**	.18	.57**	.32	.42*	.22

Table V.9

Correlations between the Family Environment Scale and the Family Adaptability and Cohesion Evaluation Scales (FACES III)

	FACES III	
Family Environment Scale	Perceived Score	Discrepancy between Perceived and Ideal Scores
Cohesion	.62**	-.23
Expressiveness	.50**	-.32
Conflict	-.44*	.42**
Independence	.19	.00
Achievement Orientation	.19	-.20
Intellectual - Cultural Orientation	.71**	-.51**
Active - Recreational Orientation	.69**	-.60**
Moral - Religious Emphasis	.47**	-.20
Organization	.15	-.09
Control	-.15	.04

Table V.10

Proposed Core Measures for EIRI Longitudinal Studies

CORE PRE	CORE POST
2 hrs. ---Battelle Developmental Inventory (full scale)	2 hrs. ---Battelle Developmental Inventory (full scale)
20 min. --(PSI) Parenting Stress Index (FSS) Family Support Scale (FSS) Family Resource Scale	1 hr. ----Vineland Adaptive Behavior Scales- Revised
	30 min.---(PSI) Parenting Stress Index (FSS) Family Support Scale (FRS) Family Resource Scale
20 min. --Family Adaptation and Cohesion Evaluation Scales, and Family Inventory of Life Events and Changes	20 min.--Parent satisfaction with services
	10 min.--Parent report of child's health during past year
10 min. --Demographic Questionnaire Informed Consent	

Proposed Measures

Core Measures

Based on the advice of advisory committee members and other experts, the review of instruments and the various studies that were conducted, specific instruments for the core assessment battery are proposed as shown in Table V.10. These measures will be administered annually to all children and families in the 16 longitudinal studies.

The core measures selected for the pretest represent a range of variables which will be important both for stratification prior to random assignment to groups and potential covariates for the posttest analyses, as well as investigating several hypotheses related to the theoretical/ conceptual framework which has guided the development of the longitudinal studies. For example, it may be that interventions add very little for a mild to moderately mentally retarded child who lives in a close-knit, well-educated, financially secure family; whereas it may be very beneficial for a similar child who lives in a single parent low socioeconomic family. Such aptitude by treatment interactions, or 'value added' hypotheses will be impossible to investigate unless adequate demographic and family functioning data of the type proposed for the pretest core battery are collected.

The core measures selected for posttesting represent the ones with the greatest potential for reflecting overall differences between experimental and control groups across the 16 studies. The Battelle Developmental Inventory was selected as a core child measure based on its positive characteristics, as described in the initial proposal, as well as the support obtained from expert recommendations and the validity studies conducted this year. The Vineland Adaptive Behavior Scales--Revised was selected as a core posttest child measure due to its recommendation during the assessment conference. Staff agreed that the child's social and adaptive behavior should be a primary outcome variable.

Assessment of family integrity prior to participation in the research project will be accomplished through pretest administration of FACES III and the Family Inventory of Life Events and Changes. Aspects of family functioning which are expected to be impacted by the experimental interventions will be assessed pre- and posttest. As their titles imply, family stress, resources, and support will be assessed through administration of the Parenting Stress Index, Family Support Scale, and Family Resource Scale. The result of the administration of the family measures to the parents participating in the Salt Lake Feasibility study supports their appropriateness for inclusion. A measure of parent satisfaction with services (which includes a description of all additional services received by the family that might be expected to assist with the conditions caused by the child's handicapping condition), as well as a report of the child's health during the past year, will also be collected at posttest time.

Complementary Measures

The core assessment battery is designed to reflect general differences between the experimental and control groups in each of the 16 studies. In order to reflect the specific differences expected as the result of the particular question under investigation, complementary measures will be administered. While an intensive review of the measures to be included in the core assessment battery was undertaken, it was not possible to review all of the complementary measures in this manner. Thus, the suggestions for the complementary measures may change based on the feasibility and utility of administering the various instruments. For example, many of the measures recommended for the hearing impaired (e.g. The Grammatical Analyses of Elicited Language, or the Maryland Test of Syntactic Ability) may require specific expertise and be too time consuming for the "blind" diagnosticians

to administer. Tables V.11 and V.12 describe the complementary measures proposed for each of the 16 longitudinal studies.

Recruitment, Training, and Monitoring of Diagnosticians

Due to the selection of the Battelle Developmental Inventory as the core child outcome measure, considerable effort was expended to develop training procedures for this test. As a new test, most potential diagnosticians have not yet had exposure to it, yet it requires much review and practice prior to actual administration. The following section reviews the procedures which will be used for recruiting, training and monitoring the diagnosticians who will administer the outcome measures.

Recruitment

In order to ensure the quality of data collected for the Longitudinal Studies, an assessment supervisor and several diagnosticians will be recruited from the geographic area of each of the 16 studies. The assessment supervisor will be a university-based or certified psychologist with training and recent experience in individualized testing. Diagnosticians will be recruited who have at least a bachelor's degree and some work towards a Masters, with course work and experience in individualized testing. Depending on the sample size of each study and whether there are multiple studies being conducted in the same geographical area, recruit one supervisor and 3-5 diagnosticians in each geographical area. Based on the experience during the feasibility studies in Illinois, this type of recruitment does not appear to be problematic.

Training

Based on the work done during the feasibility studies a rather ambitious program for training diagnosticians had been conceptualized. Depending on the amount of funds we are able to raise from private sources, all of the activities described below may not be possible, but the full package is designed to indicate the ideal which will be sought.

Table V.11
Tentative Complementary Posttest Measures for Projects at End of Year #1

CATEGORY	PROJECT NO. AND NAME	MEASURES
I. Mixed Handicaps 3-5	16. SLC Parent@	Parent Knowledge, Locus of Control, Parent/Child Interaction, Minnesota Child Development Inventory
	15. Des Moines	Parent Knowledge, Locus of Control, Early Childhood Continum of Assessment Programming Evaluation and Resources (CAPER), Parent/ Child Interaction
	17. N. Y. Down syndrome	Parent Knowledge, Locus of Control, Minnesota Child Development Inventory, Preschool Language Scale, Developmental Test of Visual Motor Integration
	20. Miami, FL	Minnesota Child Development Inventory, Locus of Control
	19. Reno, BD	Burks' Behavior Rating Scales, Kaufman Assessment Battery for Children
	7. Phoenix, PICU	Parent Knowledge, Locus of Control, Minnesota Child Development Inventory, Neuro-Developmental Assessment
II. Mixed Handicaps 0-3	6. SMA/Lake McHenry@	Wisconsin Behavior Rating Scale, Toddler Temperament Scale, Impact on Family Scale
	10. Wabash/Ohio	Sequenced Inventory of Communication Development, Minnesota Child Development Inventory
	5. Sunshine School	Locus of Control, Minnesota Child Development Inventory, Sequenced Inventory of Communication Development
	14. New Orleans ARC	Brigance Diagnostic Inventory of Early Development, Sustained Attention, Wisconsin Behavior Rating Scale
	8. Citizens for Disabled	Locus of Control, Sequenced Inventory of Communication Development, Bayley Scales of Infant Development
III. Hearing Impaired	4. Alabama	Peabody Picture Vocabulary Test, Grammatical Analysis of Elicited Language, Meadow-Kendall Social-Emotional Developmental Inventory, Maryland Test of Syntactic Ability
	18. Arkansas	Peabody Picture Vocabulary Test, Grammatical Analysis of Elicited Language, Meadow-Kendall Social-Emotional Developmental Inventory, Maryland Test of Syntactic Ability
	12. Indiana School for the Deaf	Peabody Picture Vocabulary Test, Grammatical Analysis of Elicited Language, Meadow-Kendall Social-Emotional Developmental Inventory, Maryland Test of Syntactic Ability
IV. Visually Impaired	2. Louisiana State University	Peabody Mobility Scales, Uzgiris-Hunt Scales, Early Intervention Developmental Profile
	3. Alabama	Peabody Mobility Scales, A Social Maturity Scale for Blind Preschool Children, Child Improvement (Locus of Control) Questionnaire, Impact on Family Scale
V. IVH or PVL	1. LSU #1@	Movement Assessment of Infants, Premature Infant Behavior Scale, Carolina Record of Individual Behavior, Early Intervention Developmental Profile, Toddler Temperament Scale
	9. LSU #2@	Movement Assessment of Infants, Premature Infant Behavior Scale, Carolina Record of Individual Behavior, Early Intervention Developmental Profile, Toddler Temperament Scale
	13. San Diego@	Peabody Developmental Motor Scales, Minnesota Child Development Inventory, Bayley Scales of Infant Development, Toddler Temperament Scale, Parent/Child Interaction, Strange Situations, Neuro-Developmental Assessment
	11. South Carolina	Peabody Developmental Motor Scales, Minnesota Child Development Inventory, Bayley Scales of Infant Development, Toddler Temperament Scale, Parent/Child Interaction, Strange Situations, Neuro-Developmental Assessment

@Projects with severely handicapped children

ble V.12

mmary of Projects in which each Posttest is Used During Year #1

me of Measure	PROJECTS																			
	LSU-IVH #1	LSU - VI	Alabama-HI	Alabama-VI	Sunshine School	SMA/Lake McHenry	Poenix PICU	Citizens for Disabled	LSU-IVH #2	Wabash/Ohio	South Carolina IVH	Indiana School for the Deaf	San Diego PVC	New Orleans ARC	SLC Parent	Des Moines	NY Down Syndrome	Arkansas-HI	Reno BD	Miami, FL.
Battelle Developmental Inventory	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Vineland Adaptive Behavior Scales Revised	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Parenting Stress Index	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Family Support Scale	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Family Resource Scale	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Parent Satisfaction with Services	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Parent Report of Child's Health	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bayley Scales of Infant Development								X			X		X							
Parent/Child Interaction											X		X		X	X				
Child Improvement (Locus of Control) Questionnaire		X		X	X		X	X							X	X	X			
Peabody Developmental Motor Scales											X		X							
Brigance Diagnostic Inventory of Early Development														X						
Minnesota Child Development Inventory					X		X			X	X		X		X		X			X
Toddler Temperament Scale	X					X			X		X		X							
Strange Situations											X		X							
Parent Knowledge							X								X	X	X			
Early Childhood Continuum of Assessment, Programming, Evaluation and Resources (CAPER)																X				
Burks' Behavior Rating Scales																			X	
Sustained Attention														X						
Impact on Family Scale				X		X														
Sequenced Inventory of Communication Development					X			X		X										
Meadow-Kendall Social-Emotional Developmental Inventory for Deaf Students			X									X						X		
Developmental Test of Visual Motor Integration																	X			
Preschool Language Scale																	X			
Kaufman Assessment Battery for Children																			X	
Wisconsin Behavior Rating Scale						X								X						
Peabody Picture Vocabulary Test			X									X					X			
Grammatical Analysis of Elicited Language			X									X					X			
Maryland Test of Syntactic Ability			X									X					X			
Peabody Mobility Scales		X		X																
A Social Maturity Scale for Blind Preschool Children				X																
Neuro-Developmental Assessment							X				X		X							
Movement Assessment of Infants	X																			
Premature Infant Behavior Scale	X																			
Carolina Record of Individual Behavior	X																			
Early Intervention Developmental Profile	X	X																		
Uzgiris-Hunt, Ordinal Scales of Psychological Development		X																		

Training of diagnosticians can be categorized into two subsections: individualized and group training. As described below, the individualized training will occur prior to the EIRI-conducted group training. Individualized training will be videotaped or print-based, highly structured, and self-paced so that it can be done individually by each of the diagnosticians or under the direction of the assessment supervisor in that locale. The group training will be conducted by EIRI staff and will be attended by the assessment supervisor for that area, each of the diagnosticians, and staff from EIRI. The specific contents of each part of training are described below.

Individualized Training. Prior to the group training, each diagnostician will be expected to complete a series of training activities using videotapes and reading materials that will be supplied by the institute. A prototype of the first videotape has been developed and provides a brief overview of the purposes, organization, and administration techniques for the Battelle. At the conclusion of this videotape, trainees will be instructed to study certain sections of the examiner's manual and the Personal Social Domain Manual. After completing their study, they will view another videotape which demonstrates the administration of the Personal Social Domain items. The trainee will be provided with a completed annotated protocol from the assessment shown on the videotape. A brief two to three minute summary of particular procedures or techniques to note about the way that the assessment was administered and/or scored, will be summarized at the conclusion of the videotape.

Similar videotapes for the Adaptive Domain, Motor Domain, Communication Domain, and Cognitive Domain will be produced for subsequent viewing using different test-administrators and different children for each domain. Children will represent a range of ages and handicapping conditions. Test administrators will be carefully selected to model the best administration

techniques. For each domain shown, specific pages will be identified in the manual for study, and the tape will be accompanied by a completed annotated protocol. There will be an indication in the lower right-hand corner of the screen of which item is being tested at any given time, and there will be a summary at the conclusion of each segment about points to note about the administration.

In those cases where trainees are viewing the videotapes under the supervision of the assessment supervisor in that area, they will be directed to practice administering items from that domain with another trainee following their viewing of the videotape. In cases where there is no supervisor for this part of the training, trainees will be asked to practice later in a group training session.

After the trainee has viewed all of the videotapes, he or she will be directed to complete a self-mastery test which will assess the trainee's mastery of standardized procedures, scoring procedures, test organization, and item content. Trainees will be directed to complete the test without looking at the test manuals, but will then be provided with an answer key to check their work and to continue to study in those areas in which they are having difficulty. The assessment supervisor in each area will be responsible for making sure that trainees complete all of the training materials before participation in the group training.

Group Training. Based on the training sessions held in conjunction with the feasibility studies, a four-hour long group training session will be scheduled and conducted by EIRI staff and will be attended by each of the trainees and the assessment supervisor in the area. The first 30 minutes will be devoted to a brief review of the Battelle and the individualized training. Participants will have an opportunity to clarify issues or ask questions. Following this, participants will be divided into pairs and the next 2 hours will be devoted to supervised practice with feedback. Scripts

will be prepared for the person playing the role of the child or the parent so that standardized situations are created and each participant will have an opportunity to practice all of the relevant activities.

Following this practice, there will be a 30-minute session on scoring in which a videotape will be used to portray administration of certain items. For each item there will be an opportunity for participants to indicate in a group discussion how they think the item should have been scored with feedback and discussion directed by the EIRI staff.

At the conclusion of the training, the following mastery tests will be completed by each trainee:

1. Paper and Pencil Test. This test will be similar to the mastery test administered at the end of the individualized training, but it will be a "closed book test."

2. Identifying Correct/Incorrect Administration. Trainees will view a 15 to 20-minute videotape which portrays a segment of the Battelle Developmental Inventory being administered. During this administration, the diagnostician will do most things correctly, but there will be 15 to 20 mistakes ranging in seriousness from minor to very major. A completed protocol will accompany this videotape. Trainees will be asked to identify mistakes that are made during the administration.

3. Scoring Exercise. Trainees will be shown a videotape of portions of a Battelle Developmental Inventory in which there is no completed protocol to accompany the videotape. Trainees will be provided with a blank protocol for the test and will be asked to score the test as they watch it and, following the administration, to summarize the results.

Trainees who pass these three mastery tests will be required to administer three Battelle's on their own to young children under the age of 5 with at least one of those children being handicapped. Following the submission of the protocols from these three Battelles to the assessment supervisor in that area, trainees will be required to administer one more Battelle under the supervision of the assessment supervisor. The assessment supervisor will be responsible for making the final determination at this point regarding the trainees' readiness to function as a part of the assessment team.

In order to motivate complete preparation, supervisors will be asked to certify that trainees have completed all of the pre-group training material before attending the group training. In those cases where it is obvious that trainees have not given sufficient attention to the pretraining material, they will not be allowed to complete the group training. Secondly, trainees will be paid $200 for successfully completing the group training and being certified as an assessment specialist for the project. No money will be paid to those who do not successfully complete the training.

Monitoring

In order to ensure accuracy in test administration, the following monitoring procedures will be used during actual data collection. First, diagnosticians will always function in pairs and, following each administration, the partner of each diagnostician will be required to review the completed protocol, check the computations, and certify that everything is appropriate by signing the protocol. In this way, any clerical, computational, or logical mistakes can be corrected immediately, while the assessment is still fresh in the person's mind.

Secondly, at the end of each assessment week the supervisor in that area will collect all of the protocols and mail them to EIRI via certified mail. Before mailing the protocols, the supervisor will review each protocol briefly and do a spot check of computations to catch any serious errors. In addition, he or she will identify which children remain to be tested so that there are no children who are inadvertently missed. Finally, the assessment supervisor in each area will observe 10% of the test administrations for each child. In this way, any diagnosticians who are having difficulties will be identified early, necessary remedial work accomplished, or a different diagnostician used.

Additional procedures for training and monitoring diagnosticians were developed and field-tested in the three Illinois feasibility studies. The materials are included in Appendix B. In general, they proved to be a useful way of ensuring that data collection in each of these sites proceeded smoothly.

VI. ECONOMIC EVALUATION

A major thrust of the Institute will be to conduct state-of-the-art economic analyses. The rationale for this thrust is that evaluation of both costs and effects is necessary to consider the value of early intervention. The most effective program may not be the most "cost-effective." Likewise, the least expensive program may not be the most "cost-effective." Economic analysis allows us to evaluate costs and effects simultaneously, providing a more complete set of information for selecting the "best" program.

Cost-effectiveness is actually only one of several economic analysis techniques available for program evaluation. The other technique that is relevant to the proposed research is cost-benefit analysis. Although these terms are sometimes used interchangeably, they are distinctly different techniques (Levin, 1983).

Cost-effectiveness analysis is a way to study the relationship between program outcomes and program costs. It is most useful in considering alternative strategies to address the same problem. Programs can be compared on how much they accomplish with each dollar invested in them.

Cost-benefit analysis is a way to compare the dollar value of a program's advantages (benefits) to the dollar value of its disadvantages (costs). It requires a comprehensive measurement of program effects and the estimation of the economic value of those effects. Often cost-benefit analysis is only partially accomplished, with the researchers recognizing that some important program effects could not adequately be represented in terms of dollars.

For Research Option 1, cost-benefit analysis is clearly the appropriate technique. In Years 2 through 5, cost data will be collected and the economic value of short- and long-term effects will be estimated. It is anticipated that by Year 5 it will be possible for many of the programs to estimate the dollar value of long-term reductions in the cost of post-

intervention education, care, and treatment, and to estimate the intervention's value to the family. In each of these studies, the benefit-cost analysis will be incomplete because some benefits are difficult to value, and long-term effects will probably continue beyond this initial study period.

For Research Options 2 and 3, either benefit-cost or cost-effectiveness analysis may be appropriate. Which is used will depend on two factors: (1) the degree to which there are important multiple outcomes, and (2) the degree to which outcomes are amenable to monetary valuation. When there are multiple effects, cost-effectiveness does not always indicate a clear "winner" in program comparison. For example, if we compare two programs that affect motor and language skill development, we may find that one is superior in developing motor skills, while the other is superior in developing language skills. In such cases, benefit-cost analysis becomes more attractive because it lets us estimate the value people place on each type of outcome and sum those values to yield a single measure of benefit for each program. On the other hand, it is difficult to estimate a monetary value for many types of early intervention program effects, and this makes cost-effectiveness analysis more attractive. We anticipate that both techniques will be used to some extent.

Collection of Cost Data

Economic analysis requires that the components of each alternative treatment be clearly specified. Using all available sources (e.g., written documents and interviews with project staff), a detailed description will be drawn up. Descriptive data will include: number of children by age, handicap, severity, and developmental level; number of teachers, aides, administrators, and volunteers; instructional programs used; instructional mode used (individual or group); support services involved; transportation requirements; outcome measures; and parental involvement. During the

baseline period, forms were developed to collect the descriptive data. The forms were pilot-tested in Illinois and have been revised based on these pilot studies so that they are now ready for use. The forms and the results of the pilot test are discussed under Activities during 1985-1986.

Project budgets usually do not accurately reflect the total costs of a program. For instance, the value of parent time is not usually included as a cost when using home-based models. Also, volunteers, aides, or even facility costs are not listed as an expense to center-based programs, although they do represent expended resources. To overcome the problems with using budget figures, the costs of implementing each of the program descriptions will be defined and measured using the "ingredients" method proposed by Levin (1975, 1983).

The ingredients approach is a systematic, well-tested procedure for identifying all of the social costs for implementing alternative programs, including costs that are often omitted from cost analysis such as contributed (in-kind) and shared resources. In this approach, an exhaustive list of resources used by each alternative is developed, and the ingredients are costed according to market (salaries), estimated (parent time), or adjusted value (the proportional costs to one program using a shared building). Costs are then distributed according to constituencies (the payees), adjustments are made for transfer payments (which have no net costs) and the net costs are calculated. Using this approach, it is possible to ascertain the overall costs for each alternative program as well as the costs to various contributing groups. Since the concepts and skills involved in economic analysis are relatively new, most site staff be unfamiliar with the procedures. We have developed, tested, and revised the cost data collection forms so that they do not require a background in economic analysis to generate accurate cost data.

Possible Level of Cost Analysis

Cost analyses can be appropriately conducted at different levels depending on the resources available and the objectives of the study. Based on our past experience with early intervention programs, we have found that cost data can be usefully collected at a number of different levels of specificity. At least the following five levels are possibilities for a study such as this.

(a) Examination of program budget information plus interviews with program staff to determine the value of budgeted, donated, and shared resources and which program characteristics have a major impact on costs.

(b) Time logs kept by program staff on either a continuous or sampled basis in which staff members indicate how their time is spent on various activities.

(c) Time logs in which program staff indicate the activities in which they engage, broken down by subsets or clients served. This is the same kind of time log described above, but at a finer level of specificity. For example, in "b" staff members might indicate direct instruction from 9 to 10, whereas at the "c" level of data collection they might indicate that they do small group work with the four children that have social skills problems from 9 to 9:15; from 9:15 to 9:30 they do story time with the entire class; from 9:30 to 10:00 two children go to speech therapy outside the class and the remaining children are divided between the aide and the teacher to work on gross motor skills.

(d) Time logs collected on either a continuous or sampled basis in which activities are tracked with the individual child as the unit of analysis. This data collection provides the finest level of detail.

(e) Direct observation of program activities may be conducted at any level of detail. It provides an independent check on time log, budget, and interview data.

Each successive category requires more data collection effort. Categories (b) through (d) require increasing amounts of effort on the part of service providers to complete the time logs. Each successive category also provides finer-grained detail about how people spend their time.

Assumptions Guiding Cost Analyses for Longitudinal Studies

Because cost analyses for the longitudinal studies must be used at 16 different sites, it is important that the system be feasible for

implementation by both service providers and researchers. In other words, the system must be simple enough and efficient enough that service providers who are very busy running a program will not feel overburdened by the data collection efforts. In addition, the data collected from the 16 different sites must not be overwhelming in terms of data collation, aggregation, analysis, and interpretation. There will be over 1,000 children and 100 to 150 program staff and administrators participating in the collaborative research sites.

The first priority of the institute is to collect cost data about issues that have broad policy implications. The same basic system will be used at all 16 sites. This basic system will include, at a minimum, budget and interview information. However, the basic system will be designed in such a way that individual sites, if they are interested, can extend the system to answer program-specific types of questions (e.g., are certain children in my program requiring an inordinate amount of resources; or, for speech therapists, how much time is required in travel, paperwork, and administrative tasks for each hour of service provision and how does that vary across therapists?). The extent to which time log information will be collected by type of activity will be determined by site staff and by the research questions addressed by each site. Pilot-testing in Illinois and Utah indicates that such a system requires a reasonable amount of effort, and results in the collection of useful data that can be summarized accurately and efficiently.

Cost-effectiveness Analysis Procedures

The comparison of costs and effects differs between cost-effectiveness (CE) and cost-benefit analysis (CBA). CE analysis uses a series of matrices that display the costs and effects of each intervention. A hypothetical cost-effectiveness matrix is given in Table VI.1. Such a matrix displays the relative strengths and weaknesses of each of the interventions in an

easily read format. Program C, for example, is associated with more motor skills and positive responses than are programs A or B. However, Program C has higher costs and lower IQs. The matrix approach allows several different comparisons to be made on program costs and effects. For example, costs can be divided by the group bearing the expense of the resource, or effects can be displayed according to the type of handicap, severity of handicap, or age served.

Table VI.1

Hypothetical CE Matrix for IQ, Motor Skills, and Positive Responses Across Three Interventions (A, B, C)

	Cost Per Child			Effects			
	Total	Parents	Project	IQ[a]	Skills[b]	Responses[c]	Attitude[d]
A	1,050	550	500	3	12	15	4
B	1,750	1,400	350	9	5	4	5
C	1,800	600	1,300	0	20	17	9

[a]Mean gain in IQ
[b]Mean number of skills mastered
[c]Mean number of positive responses in one trial
[d]Mean attitude-toward-child score on a 10-point scale where 10 is positive and 1 is negative.

This analysis and display procedure is used instead of the direct computation of simple cost-effectiveness ratios for several reasons. First, it may be inappropriate for the evaluators to decide which cost breakdowns and effects are the most important. For instance, some persons may value parent satisfaction more than IQ while others may have the opposite priority. In another instance, a CE comparison disregarding parent time may be desired. The ultimate cost-effectiveness comparisons must be left to the decision-making body. Second, this format displays the distribution of the intervention costs and effects. For example, in Table VIII.1, the parents

in Program B bear more of the costs than do parents in Program A or C. However, the parents in Program C benefit more from better attitudes than parents in Program A or B. This disaggregation provides decision-makers with valuable information about political and social impacts of the program. Third, the matrices are easily comprehended by readers without an economics background. Thus, the data are available to a wide audience, increasing the usefulness of the cost-effectiveness data. Fourth, cost-effectiveness ratios do not provide a reliable ranking of programs in terms of economic efficiency (Barnett, in press).

Cost-benefit Analysis Procedures

Cost-benefit analysis (CBA) is most important for Research Option 1 and for Research Options 2 and 3 as longitudinal data become available. CBA data on costs and effects are combined by estimating the dollar value of effects. Because the process of estimating the dollar value of effects is almost always incomplete, it yields a conservative estimate of the cost-benefit ratio. However, such analyses can be accomplished with early intervention studies to a much greater extent than non-economists often suppose (Barnett, 1985 a; b). For the institute's analyses, three types of measures will be used to quantify the benefits of early intervention.

Savings in costs of care. One measure of benefits is the cost savings which are generated by increasing the capacities of handicapped infants and children, or improving the efficiency of the service delivery system. These cost savings may occur because less intensive services are needed post-intervention or because intervention provides a better transition to later services that increases productivity or reduces cost. For example, the Perry Preschool Study analyzed cost savings in education and social services (Barnett, 1985a; Berrueta-Clement et al., 1984). Significant cost differences were observed as early as two and three years after the intervention, based on public school records and budgets. Others who have

found substantial later educational savings are Seitz, Rosenbaum, and Apfel (1985) and Weiss (1981).

Cost savings to households. Families with handicapped children have substantially higher child-related expenses of time and money than do families without handicapped children. This applies to many ordinary activities as well as to special activities not required for non-handicapped children. The randomized experimental designs will allow us to measure cost savings by comparing time use and out-of-pocket expenditures for experimental and control families. At selected sites, time diaries will be used to collect samples of time use data for analysis. Procedures for this have been well developed for economic studies of the effect of children (age and number) on parent's time (Hill & Stafford, 1974; 1980; Hunt & Kiker, 1984). Time diary information can also be very useful for exploring program effects of parental time available for leisure, household activities, and labor of force participation, all of which have implications for family stress and income. Another procedure that can be followed is to estimate the value of such program-provided services as child care by using the market value of services usually purchased by families similar to those of the study (Barnett, 1985b).

Willingness-to-pay by households. Most complete benefit estimation procedures estimate the value of an intervention program and its effects to families beyond the cost savings discussed above. The techniques used to produce more complete estimates of benefits are generally classed as either (1) "hedonic" approaches or (2) direct measures of willingness-to-pay. The hedonic approach involves the estimation of a "household production function" based on expenditures of money and time by household members on various goods and services (Lancaster, 1966), or the identification of differing prices or wages accepted in order to participate in the activity. Estimation of a household production function can involve difficult

theoretical and empirical problems and requires relatively large amounts of detailed data collection by household (Barnett, W., 1977; Barnett, W. S., 1983; Muellbauer, 1974; Pollack & Wachter, 1975).

The second approach to valuation, direct elicitation of willingness-to-pay through "bidding games," might also be successfully applied to early intervention programs and their effects. However, the problems of strategic and other biases which are often suspected in hypothetical responses may be a problem. Also, it is sometimes difficult to elicit responses from individuals in cases where very detailed descriptions of the "game" must be used; this would be the case for valuing specific treatment variations in intervention components. Possible solutions to these problems have been suggested, and our staff have had some success in using this approach (Escobar, 1986). We continue to develop this approach.

Activities During 1985-86

The 1985-86 year has been devoted to developing the protocols and procedures for the basic system which meets the assumptions described above. An initial version of the cost forms was developed based on previous experience and pilot-tested on four programs in Illinois over the 1985-86 year. Some of the site management staff were intimidated by the forms and did not feel entirely confident in completing them. This led us to revise the forms. We have made the process of completing the forms more friendly and flexible. Program staff can call us for help and can enter information at different levels of aggregation depending on how it is available. For example, fringe benefits may be entered as a gross percentage of salary or in amounts for each type of benefit. We have also reduced the level of detail asked for by items where the cost was difficult to estimate, but so small that it had no real significance (e.g., complete equipment inventory). Due to the difficulties that a few sites had with the cost forms, we developed an option for telephone consultations in which we talk through the

forms step-by-step. In these consultations the site manager has ready all of the information necessary to complete the forms based on an initial reading. The phone call allows for questions and for accommodation of program or funding peculiarities. If additional information is needed, that is determined during the phone call and the information obtained at a later time. The phone consultations require about one hour. Obviously, this is considerably less expensive than a site visit.

It seems likely that sites will need varying levels of support in the collection of cost data. Some will be able to complete the forms independently. Others may require phone consultations to provide accurate information. Rare cases may require site visits by our staff in order to collect the data. In any case, we will conduct some site visits for detailed data collections to check the accuracy of data collected using the less expensive procedures.

The pilot-test of the cost collection forms allowed direct observation of the strengths and weaknesses of the system. Overall, response was good; fairly complete data regarding costs were collected on personnel (salaried and contracted), volunteers, facilities (building, land, and capital improvements), transportation (vehicles, staff, and child), capital equipment, materials/supplies, utilities, insurance, and additional (miscellaneous) expenses of the programs.

There were a few problem areas. For example, in some programs it was difficult to account for volunteer time. Although these four programs all stressed the importance of parent time to the success of the program, none reported the use of parents as volunteers. Since this can represent a significant cost (e.g., one program estimates the involvement of approximately 300 parents which when properly accounted for, accounts for

23% of the total cost[1]), it has been emphasized on the revised version of the forms. Also, a parent questionnaire is included which will be used to assess the quantity and cost of parent time associated with the intervention. (A copy of the questionnaire can be found in Appendix C.) Equipment costs were also difficult for programs to compile. Some programs provided extensive information on equipment and others listed only a few items, so bookkeeping differences could result in an inflated or deflated cost. However, equipment accounted for no more than 1% of total costs, so this is relatively unimportant. Transportation was also a potential problem area for two reasons: Some programs may enter travel unrelated to the program; and, children's transportation is typically unaccounted for unless the program provides it. The first can be detected if the mileage figures seem inflated and the program may be called for verification. The cost of children's transportation for these programs is, as of now, incomplete if parent-provided. A very gross estimate, at best, can be calculated if time or mileage information is not provided. Both the cost forms and the parent questionnaire attempt to collect these data, but it may be difficult to obtain accurate data for some programs without a parent interview regarding time use and transportation.

The pilot testing of these forms also provided an indication of how program staff respond to the cost data collection task. After completing the cost forms, the programs filled out a response form which asked for the amount of time they spent on data collection, the number and type of staff required to complete the forms and any specific problems or suggestions they might have. Response varied but was usually positive, and useful suggestions were adopted in the revision process.

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[1]Assuming cost per hour equals the 1985 average wage rate in the U.S. of $8.74/hour for time contributed to the program (U.S. Department of Labor, Bureau of Labor Statistics, 1986).

Aside from a few minor rough spots, the system works and will be applied to the 16 sites with the following improvements. Revisions were made based upon the pilot test, and a set of model costs forms have been completed. (A copy of the model is attached in Appendix D.) The model is a fictitious program for which the cost forms have been completed. The model forms will be sent along with the blank forms to serve as a guide and to illustrate level of detail and type of response we are seeking for each cost category.

In addition to the cost forms used with the four pilot sites (which will be returned to the institute for completion), another set of forms was developed for use by five other Illinois sites who are not working directly with the institute and consequently will complete the cost data on their own. These forms are basically a duplication of the first set but they take the program through the final steps required to determine the total cost of the program, cost per child and service cost per hour. The forms explain how to account for non-budgeted resources, such as parent time or contributed facilities, and how to allocate costs to the constituencies responsible. A table of annualization factors, which accounts for interest and depreciation costs (Levin, 1983), is provided so that the cost of capital equipment and facilities may be appropriately allocated. A model cost summary worksheet, which indicates the final step in estimating a program's total costs, is provided in Appendix E.

During the past year, staff have completed extensive papers on the application of economic analysis in early intervention studies (Barnett, in press) and critically reviewing the existing literature on the economics of early intervention (Barnett & Escobar, 1986). These papers are key steps in developing and conducting sound economic studies and are included in Appendix F.

New Directions

Cost analysis is limited to one aspect of the decision regarding early intervention for handicapped infants and young children--supply. Economic evaluation of program effects to estimate the dollar benefits or even just the effectiveness expands the analysis to include part of the demand side of the decision. The development of our general systems model and experience over the past year have led us to propose a more complete supply and demand analysis. If the analysis is incomplete, we risk bias in estimating other relationships in the model. Thus, we will expand the parent questionnaire to include items regarding the availability of community resources, parental resources, and parents' preferences for various types of early intervention services. With such information we can complete the economic analysis of supply and demand as part of the general systems framework for analysis of early intervention. The results will help us to understand what program characteristics are considered to be important by parents, and how parents' assessments of importance are affected by family characteristics (income, employment, education, structure) and the child's handicapping condition (type, severity, age of identification).

VII: VERIFICATION OF TREATMENT IMPLEMENTATION

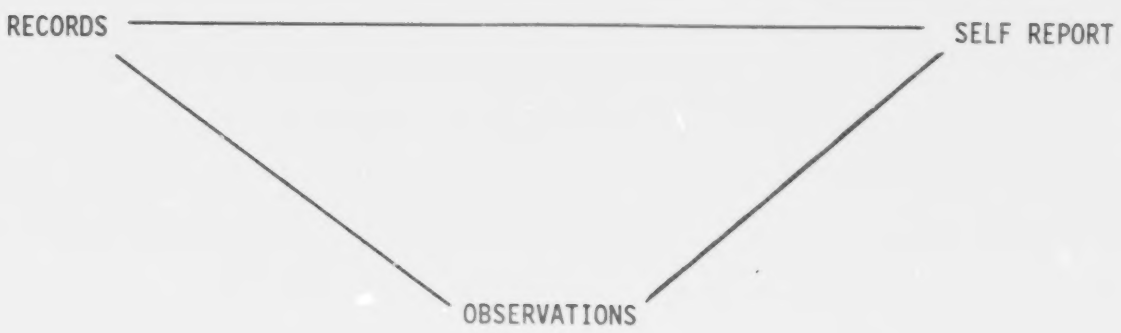
In order to ensure that the interventions which are proposed in the 16 studies are actually implemented as intended, a comprehensive verification of treatment implementation will be implemented. The following includes a rationale for the verification processes proposed, a description of proposed verification processes and examples of these verification processes as they were implemented in the Salt Lake City feasibility study. Although some of the activities projected are dependent on securing additional funding, the proposed verification plan represents an extension of current "best practices" in treatment implementation.

Rationale for Verification Process

In a recent meta-analysis of the early intervention efficacy research, Casto and Mastropieri (1986) found that verification of treatment implementation was one of the most neglected aspects in efficacy studies. Research reports typically included inadequate descriptions of the treatment to be offered and provided almost no data as to degree of treatment implementation. It is imperative that this weakness be addressed so that the interpretational problems and ambiguities which can result when there is insufficient evidence regarding the degree of treatment implementation can be kept to a minimum.

Multiple data sources should be used to cross validate treatment implementation data sources. These procedures, which have been labeled triangulation procedures (Denzin, 1978, Mercer, 1979), require that data from one source be verified or confirmed by data from other sources. In the case of treatment implementation, self-report data collected from intervention personnel will be compared to data collected through direct observation and records. This procedure is depicted graphically below. In sum, triangulation methods will provide evidence of the validity of data

collected from one source by comparing it to data collected from other sources.



Specific Procedures

It is proposed that four types of data be collected as part of the verification treatment implementation process. These data sources include:

- **Demographic data**
- **Quantitative data**
- **Qualitative data**
- **External Program Review data**

A brief description of the data to be collected under each category follows:

Demographic Data

- **Family Demographic Questionnaire (Pretest)**
- **Description of Program Services (Annually)**
- **Individual Program Plans for Each Child (Annually)**

As a part of the core pretest assessment battery each parent will complete the demographic form referred to earlier in the assessment procedures. The data from this demographic form will be used in conjunction with data from family assessment measures to provide information about whether children from some types of families respond or participate differently than children in other types of families. The family

demographic form that was used successfully in the Salt Lake City Feasibility Study is found in Appendix G. At the beginning of each year each site will also provide detailed information about the types of services they intend to provide in each treatment condition as well as information about what types of individualized services are planned for each child. This detailed program information will be used as a basis for treatment verification and to tailor the data collected in the three categories described below. For example, if speech therapy is provided individually to each child by a certified speech therapist, different data will be collected than if parents are trained to provide speech therapy in the home.

Quantitative Data

- **Child Attendance (Monthly)**
- **Amount of Individualized Services Provided (Monthly)**
- **Parent Checklist of Home-Based Training (Monthly)**
- **EIRI Staff Visits (2 Times/Year)**

Data will be submitted monthly by each program regarding the types of services which were delivered to each child during the preceding month. These data will include attendance data for each child if it is a center-based program, intervenor logs of all one-on-one therapeutic activities such as speech therapy, physical therapy, and occupational therapy, and a summary of parent activity in those cases where the parent is expected to deliver substantial services in the home.

The reason this type of data is so important is demonstrated by the results of the Salt Lake City feasibility study. During this relatively short term study, there were no observed differences between the treatment groups on child or family outcome variables. An obvious question when there are no observed differences is whether the intended treatment differences between groups really occurred. In this case it was possible to verify that treatments were implemented as planned because of: (a) attendance records

for both child attendance and parent attendance to training sessions, (b) the collection of data forms which parents used as they implemented home assignments with their children, (c) the collection of a time sampling log which indicated how much time parents spent with their children on various instructional activities, (d) interviews with those staff who conducted the parent training (they were asked to judge whether or not parents were implementing the treatment as assigned), (e) audio tape recordings of the parent training sessions which were reviewed by EIRI staff to ensure that parent training was conducted as intended, (f) on site visits by EIRI staff to observe program operation and coordinate necessary technical assistance efforts.

Qualitative Data

- **Supervisor Ratings of Quality of Staff Services (2 Times/Year)**
- **Home Visitor Ratings of Parents' Ability to Deliver Effective Services (2 Times/Year)**
- **Rating of Family Engagement (2 Times/Year)**
- **Parent Questionnaire:**

  Types of Services Child Has Received (Annually)

  Parent Satisfaction With Services (Annually)
- **EIRI Staff Telephone Contact (2 Times/Month)**

Two types of qualitative data will be collected for each of the sixteen sites. First, a supervisor will complete a brief EIRI developed checklist to rate the quality of intervention being provided by each staff member who has major responsibility for intervening with children. This checklist will be completed two times each year. The purpose of this checklist will be to make distinctions between those that are providing high quality services and those for whom improvement would be desirable. This information can be used in providing inservice training as well as being accounted for in the data analysis. For parents who are expected to deliver substantial intervention

services in the home, the home visitor will fill out a similar checklist twice each year.

The persons with primary responsibility for each child will also do a rating of each child and parent twice each year. This form will rate the degree to which families and children become actively involved in the intervention process. The purpose of this rating is to obtain a measure similar to engaged learning time or therapeutic engagement. Finally, each parent, regardless of what type of intervention program their child is involved in, will complete a questionnaire at the end of each year, describing the degree to which they are satisfied about the services which their child has received during the previous year. As a part of this questionnaire, parents will describe whatever other services their child participated in during the previous year either through private clinicians, other community-based programs, or even work done in the home independent of any program. Finally, EIRI staff members will have bi-monthly telephone contact with each of the intervention programs to assess the degree to which program staff feel comfortable about the services which are being delivered. If, based on these telephone contacts, problems are identified, EIRI staff will make additional visits to the program or will secure additional technical assistance.

At the end of each year, parents who are supposed to be extensively involved in the intervention process will be paid a $50 incentive to maintain up-to-date verification information. In each of those sites in which extensive home-based services are a part of the intervention program, an onsite data coordinator will be hired to coordinate the collection of those data and the follow-up with parents as necessary. EIRI staff will visit each project at least two times each year to observe program operation and coordinate necessary technical assistance efforts.

The feasibility of collecting such qualitative data was demonstrated in a number of areas as part of the Salt Lake City study. As mentioned previously, tape recordings of the parent training sessions were made so that EIRI staff could unobtrusively monitor the content of the parent training sessions and provide regular feedback to the parent trainer regarding adherence to the intended training agenda as well as suggestions regarding facilitation of group discussion. Secondly, EIRI staff asked each parent trainer to rate parents on a Likert-like 5-point scale regarding their "degree of participation" in the treatment program. These ratings were then used to conduct an analysis based on just those parents who were judged as having a high degree of participation in treatment. Third, EIRI staff collected information regarding parent satisfaction. Parents in both groups were asked to indicate 1) how satisfied they were with the quality of services that were being provided to their children, 2) how satisfied they were with activities for parents, 3) how satisfied were they with the accessibility of intervention staff, 4) how satisfied were they with the program goals and activities developed for their child, 5) how satisfied they were with their own level of participation in their child's educational program, and 6) how satisfied they were in general with the early intervention program.

External Site Visits

- **Onsite Evaluations by Independent Experts (Annually)**

Consultants who are not directly associated with either the institute or the intervention program will be hired to make an annual visit to each of the projects to verify the quality of the services being delivered. This visit will be structured so it will be helpful to the program administrators in terms of identifying areas in which improvement can be made or where technical assistance would be helpful, as well as providing feedback to EIRI about the degree to which each particular intervention program compares with

what is generally available in the field. Where weaknesses are identified and additional assistance is needed, EIRI staff will work with the program staff to secure that assistance.

To standardize the verification evaluation across the 16 sites, the external evaluator will use the EIRI program verification guide. This guide has been designed by EIRI staff utilizing the TADS Manual for Comprehensive Review (Black, Cox, Danaher, Prestridge, Trohanis, & Assel, 1984) the Accreditation Criteria and Procedures of the National Academy of Early Childhood Programs, and various Preschool Internal Evaluation Systems which were developed by the Early Intervention Institute staff members. A copy of the field test version of this program verification guide appears as Appendix H. Early drafts of this verification guide were used as part of the verification procedures in the Salt Lake City feasibility study. For example, under the "Services for Children" component EIRI staff verified that the Salt Lake site had a written statement of its philosophical and theoretical approach to services and that the project had a written statement of goals and objectives regarding services to children. Additionally, it was verified that the Salt Lake City site had appropriate screening activities in place and that assessment procedures which were appropriate and nondiscriminatory had been carried out for each child admitted to the program. Similarly, the program verification guide was used to verify that other criteria in the areas of interactions among staff and children, curriculum, administration and management and physical arrangements were present.

Taken together, these described procedures will help to ensure that high quality intervention programs are being delivered in a way which is consistent with the plans outlined for each of the studies.

VIII. MANAGEMENT

The management of a series of longitudinal research studies of the scope and complexity required by RFP 85-104 is a multi-faceted undertaking requiring hundreds of person days in tasks ranging from the rather mundane (e.g., time tracking and personnel evaluations) to conceptually and logistically complex (e.g., fund raising, dissemination activities, hiring new staff, and meetings of the advisory committee). For such a research project to be managed effectively, careful planning must occur and substantial amounts of time must be devoted to management activities. Because the Early Intervention Research Institute has been ambitious in going beyond the requirements of the contract in many areas (e.g., the training and monitoring procedure proposed for diagnosticians, the convening of conferences on assessment and parent involvement, fund raising to enable the research to be implemented more comprehensively), management tasks have required substantially more time than originally anticipated. However, the success of the base period, as described in the earlier sections of this report, is attributable in part to the substantial commitment made by all senior staff to those management functions.

The remainder of this section will discuss the advisory committee activities, the recruitment of additional staff and graduate students to work on the longitudinal studies beginning next October, dissemination activities during the first nine months, fund raising efforts, and general project management activities.

Advisory Committee

Two meetings of the national advisory committee of the longitudinal studies were held during the first nine months of the contract. As per the original proposal, the first meeting was held in conjunction with the National Early Childhood Conference on Children with Special Needs, sponsored by the Council for Exceptional Children and the Division of Early

Childhood. Holding the meeting in conjunction with such a national meeting was done in order to provide an opportunity for professionals working in the field of early childhood special education to learn more about the proposed longitudinal studies and, more importantly, to have input into how those studies would be conducted.

In addition to advertising the advisory committee meetings as being open to the public, Utah State University sponsored a dinner the evening prior to the advisory committee meeting which was attended by approximately 50 leaders in the field of early childhood special education. During this dinner, the goals and objectives of the longitudinal studies were described, the acting director of the Office of Special Education Programs commented briefly on the federal government's perspective about the longitudinal studies, a member of the advisory committee addressed the topic of "The Contribution of Research to Policy and Practice in Early Childhood Special Education", and there was a time for comment and discussion by those attending. The following day, approximately 15 people, in addition to staff and advisory committee members, attended at least part of the advisory committee meetings.

Based on our experience at the first advisory meeting, it was the recommendation of the advisory committee that the second meeting be held in conjunction with the national CEC meeting in New Orleans the following April. This was done with similar success, as 25 to 30 early childhood special education professionals attended some part of the advisory committee meeting. Because there is no similar meeting at the time that the advisory recommended the next meeting be held (January, 1987), it was decided that the next meeting would be held in Salt Lake City near the end of January 1987. However, it is our conclusion, with agreement from the advisory committee, that the strategy of soliciting input from the field and providing visibility for the longitudinal studies by holding the meetings in

conjunction with national professional meetings has been beneficial and should be considered again for the future.

Because of other obligations and other unforseen circumstances, the membership of the advisory committee has changed somewhat during the past year. The current membership of the advisory committee is depicted in Table VIII.1. As will be noted from the information in Table VIII.1, two of the original members of the Advisory Committee (Wendy Cullar and Al Healy) have been replaced because of professional obligations which made it impossible for them to participate fully in the Advisory Committee activities. Their replacements, Carl Haltom and Allen Crocker, respectively, have very similar qualifications, experience, and training, and consequently continue the same linkages which were previously present. A ninth member of the advisory committee, Dr. Steve Warren, has been added at the request of CEC's Division of Early Childhood Research Committee. We believe that the addition of Dr. Warren is particularly important because of the liaison he provides to the largest professional organization concerned primarily with early intervention for handicapped children.

The two advisory committee meetings held during the last nine months have been exceptionally productive, and have provided important insight and direction for the activities of the institute. Minutes of these two advisory meetings are included in Appendix I. Several examples of the ways in which these advisory committee meetings have shaped and emphasized the activities of the institute are provided below.

At the first advisory committee meeting it was emphasized that Option 1 should focus on comparisons of intensity of treatment rather than "treatment vs. no treatment" comparisons. This position is consistent with the original RFP, and is clearly reflected in the types of studies described earlier for Option 1. Advisory Committee members also emphasized that USU needed to retain responsibility for randomly assigning subjects to groups.

The importance of this has been affirmed by our experiences during the base period. The advisory committee also emphasized the need for EIRI to raise additional money in order to conduct the research as comprehensively as possible. They particularly emphasized the need to broaden the pre-intervention and outcome measures, and the desirability of having some control over the funding of services of each site. This advice has been instrumental in guiding many of the activities of institute staff in both the instrumentation area as described previously, and in the fund raising area as described below. Many more examples of how the discussion of the first advisory committee shaped EIRI activities will be obvious as one reviews the minutes of the advisory committee meeting and compares that with the information presented earlier in this report.

The second advisory committee meeting was similarly successful. Examples of the areas emphasized at this meeting included the need to develop explicit criteria for how sites are selected and for ensuring that sites are providing high-quality services. The decision to use an independent on-site evaluator each year in assisting with the verification of treatment implementation is one way in which EIRI staff are implementing this suggestion. The advisory committee again emphasized the need to raise additional money which could be used to hire a 1/4 time on-site coordinator for each of the studies to assist with verifying treatment implementation. They complimented the institute staff on the thoroughness of the plan for verifying treatment implementation, but questioned whether the plan could be fully implemented without additional resources.

In summary, the advisory committee has performed exceptionally well. Much advice has been given, and this advice has positively benefited the studies that will be conducted. Although attendance at meetings has not been as consistent as we had hoped, all advisory committee members have been willing to respond by phone and by writing to issues that have been

presented to them by EIRI staff. This has been done frequently and has helped to shape the directions that are being pursued.

Staffing

Shifting from a $300,000 per year project during the baseline period to a $1.4 million a year project when the longitudinal studies are implemented in October of 1986 will require a dramatic increase of both professional staff and graduate assistants. Thus, consistent with Utah State University affirmative action procedures substantial resources have been devoted to recruiting and identifying the best qualified staff to the fill those positions. A research assistant professor position and post doctoral fellowship were opened in April, and two particulary well-qualified people (Chuck Lowitzer and Bill Eiserman, respectively) have been hired. In addition, three full-time master's degree level people have been hired (Diane Behl, Collette Escobar, and Lenora Shisler). The unique capabilities of each of these people will be a significant asset to the work of the longitudinal studies. Dr. Lowitzer has extensive experience in providing services to handicapped people, is a particularly well qualified research methodologist, and has an MBA. Dr. Eiserman is an accomplished instructional designer with experience conducting research with handicapped children and a particular interest and expertise in methods of naturalistic inquiry. Ms. Behl has had extensive classroom experience as a teacher of preschool handicapped children and is particulary well qualified in the various assessment procedures and instruments used with such children. Ms. Escobar is an economist by training, and will add valuable support and assistance in the economic evaluation area. Ms. Shisler is a certified interpreter for the deaf, and has worked extensively with the hearing impaired. By training she is an instructional designer and research methodologist and will provide important expertise in both of these areas as well.

Resumes for each of these people are included in Appendix J. An additional post-doctoral fellowship applicant has been offered a position contingent on enough of the options being exercised, and another research professorship is open, which will be filled as soon as we know about the funding of the various options. These two positions will complete our professional staff openings if all four options are exercised. All of these people will be on board by September 1, 1986, in preparation for implementing the longitudinal studies in October.

We currently anticipate hiring nine graduate students for the 1986-87 year. At the present time seven have been recruited and hired, most of whom will be available to begin preparation for the implementation of the longitudinal studies by July 1, 1986.

As can be seen from the information presented above, the recruitment and hiring of staff has consumed substantial staff time and resources during the past six months. However, each of the professional staff that have been hired thus far, as reflected by their resumes, bring unique strengths and skills to the institute which will be essential for conducting the longitudinal studies. The fact that all of the staff will be in place on or before the initiation of the option period will mean that the work can proceed on schedule and in a high-quality manner.

Dissemination

Dissemination activities have not been a primary focus of this project during the last year because most of the resources have focused on planning rather than actual research. As partially described previously, however, several very important dissemination activities have occurred. For example, hundreds of brochures of the types shown in Appendix F have been distributed to interested people in the field. The institute receives approximately 10 to 15 inquiries per month requesting additional information about the institute activities and responds with these brochures, as well as two

articles which describe the work of the institute. The institute also sponsored two conferences, the proceedings of which will be disseminated in the professional literature (the first on Assessment Issues which will appear soon in Topics in Early Childhood Special Education, the second on parent involvement which will provide much of the material for a forthcoming book from DEC). Brief articles announcing the institute or describing its purpose and goals have also been printed in a wide variety of newsletters and professional publications, such as The National Center for Clinical Infant Programs: Zero to Three publication, the START newsletter, a newsletter published by the National Association of School Psychologists), and the DEC Communicator. Institute staff have also produced an annotated bibliography of family assessment measures which is generating a great deal of interest in the field. Finally, institute staff members have presented at numerous conferences and have published or submitted several articles during the past nine months. Even though dissemination was not a primary focus of this first year, the preceding activities describe a very successful dissemination effort that will lay the foundation for future dissemination activities.

Fund Raising

From the time that Utah State University agreed to accept this contract, it was clear that the amount of money available from the Department of Education would limit the research to be conducted in several very important ways. Consequently, EIRI staff have been committed from the beginning to raising the additional money that would be necessary to broaden and intensify the work that will be conducted.

Three primary areas were identified based on the advice of the advisory committee. The first was to substantially expand the type of pre- and posttest assessment data that could be collected. The original Department of Education contract provided an average of only about $40 per child for

all assessment activities. Based on the advice of the advisory committee and the results of the Assessment Conference, it was estimated that a minimum of $200 per child would be needed to collect the type of assessment data which was needed. The second most important area for additional funds was the need to purchase approximately 25% FTE time from a locally-based coordinator for each of the research projects. Again, based on our experience in the feasibility studies and the advice from the advisory committee, it was felt that it was unrealistic to expect local project staff to continue for an extended period to volunteer all of the time necessary to do a high-quality job of acting as liaison between the local service agency and EIRI. Although it was clear that people would agree to do this, it was feared that the quality of treatment implementation and verification would suffer if they were not released from some of their other activities. Finally, because funding from the Department of Education contract was limited to actually conducting the research, additional money was needed to provide the expanded services necessary for many of the research comparisons which were to be made. Thus, it has been necessary to identify collaborating service providers who either had access to additional resources or were willing to work with EIRI to raise additional resources to provide the types of expanded services necessary to implement the proposed experimental conditions.

Based on these areas of need, EIRI staff have aggressively pursued the identification of additional sources of funding. None of these fund raising efforts have been carried out with Federal funds. For example, approximately 70% of Dr. Carol Tingey's time has been contributed during this past year by Utah State University to work on the fund raising activities of the institute. Other staff have worked over-time or have been covered by state funds for the time that they were working on fund raising activities.

Thus far, fund raising activities have been very successful. For example, the National Institute of Child Health and Human Development has agreed to provide $800,000 over the four years of the longitudinal studies to expand the child and family focused assessments. The money from NICHD will substantially cover the institute's needs in this area. Additionally, the Utah State legislature has agreed to a permanent allocation of $50,000 per year to EIRI beginning July 1, 1986. A proposal has also been submitted by EIRI to the Pew Foundation in Philadelphia, Pennsylvania, to provide support for a 1/4 time coordinator in each of the 16 sites. This proposal is for approximately $1.4 million over the four years of the longitudinal studies. Although final decisions have not been made by Pew, we are optimistic that at least some support will be forthcoming. Proposals are also pending with the Mariner Eccles Foundation in Utah (for $50,000 per year), and with the Robert Wood Johnson Foundation (for an unspecified amount). Finally, smaller, but nonetheless important contributions have been obtained from DLM Teaching Resources in the form of contributed testing materials, and have been requested from Johnson and Johnson (children's toys to be used as incentives for families to continue participate), and several magazine publishers.

Efforts to assist potential projects in obtaining resources to provide expanded services have also been extremely successful. Institute staff collaborated with various service agencies in writing five proposals to the HCEEP funding program (three of which have been funded, one of which is still uncertain), two proposals to the severely handicapped initiative (one of which has been funded, one of which is still uncertain), and two proposals to the National Institute of Handicapped Research Innovation Grants program (both of which are still pending). Staff are also working to submit three proposals to an NICHD solicitation to study families of

handicapped children. If obtained, these funds would also supplement the work of the institute.

In addition, institute staff have worked with state legislatures (for example, the Illinois State Legislature is providing approximately $350,000 per year for this year and the next two years to three EIRI collaborating sites as a part of a special preschool initiative in the state) and individual service providers to identify sources of funding which could be used for the expanded services. Although funding for several of the service providers remains somewhat tenuous at this point, the overall success has been extraordinary, and we are confident that all 16 sites will have sufficient funding to implement the planned services in the way described previously.

General Project Management

In addition to the specific activities described above, general project management has proceeded smoothly. Staff meetings have been held weekly and minutes of those meetings have been included in the monthly administrative report submitted to the project officer. The performance measurement system has provided monthly management information on the amount of time being devoted to each task, which could be used to reassess priorities and assignments. As noted in the summary for the time tracking system included in Appendix L, staff had devoted more than 3,000 additional hours to the contract through the end of May than called for in the original workscope. This has been possible because Utah State University has released time for several people (Dr. Carol Tingey was released for 70% of her time, Dr. Jim Pezzino was released for approximately 60% of his time since last January, and several graduate students, clerks, and secretaries have been hired with Utah State University funds to work on this project), and other staff have devoted substantial overtime and weekends to the project.

Appendix L also contains reports from the two subcontractors from this year (Louisiana State University and Bob Rittenhouse at Illinois State University) and a draft of the Memorandum of Agreement that will be developed between EIRI and each of the 16 research sites.

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